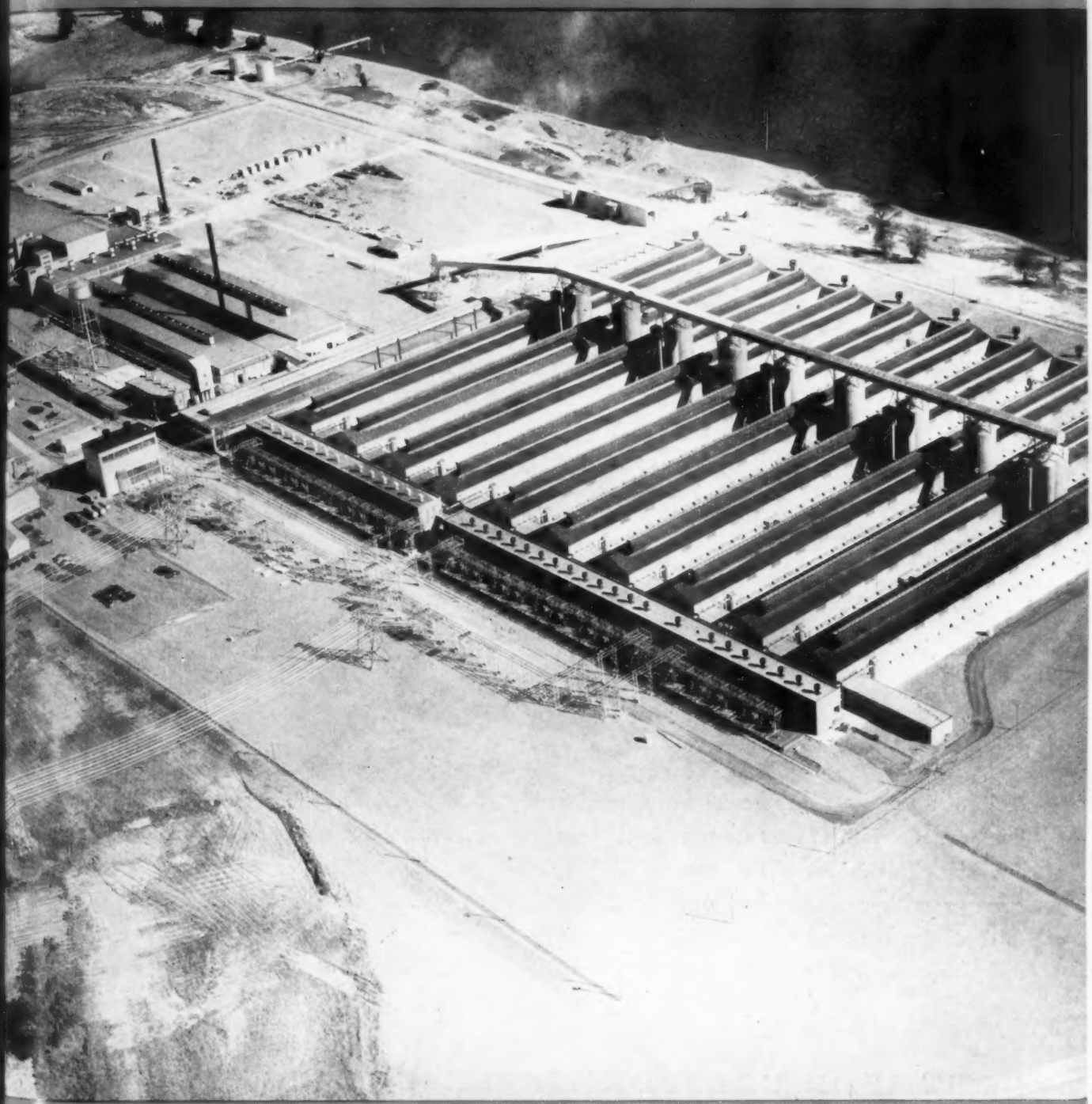
ELECTRICAL WEST

SPOKESMAN FOR THE MOST HIGHLY ELECTRIFIED SECTION OF THE U. S.

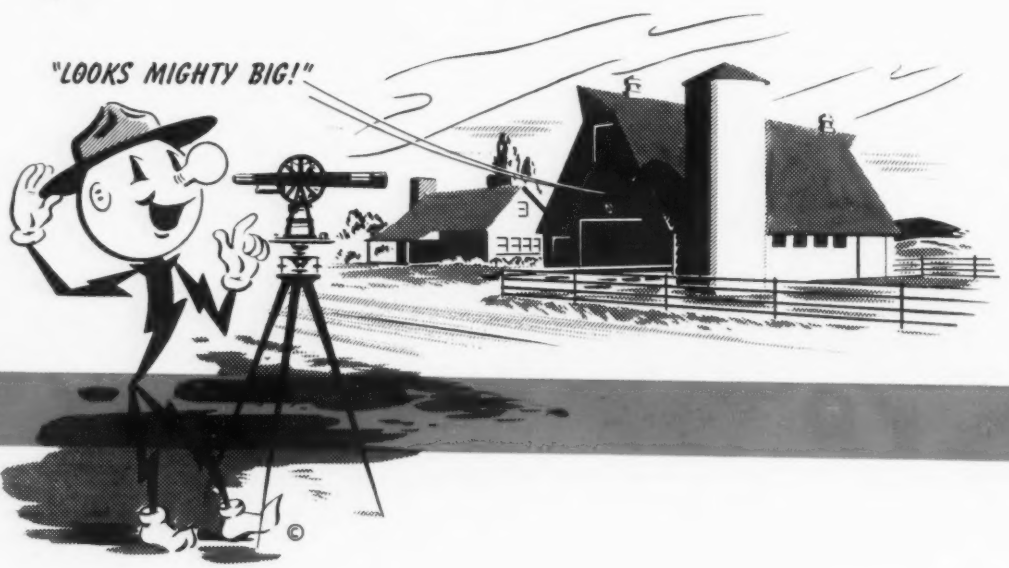


McGraw-Hill Co. of California

OCTOBER 1945

25c a Copy

SURVEYING THE *Farm Market*



81% of the farmers and ranchers in Central and Southern California want frozen food storage facilities! This is one of the facts revealed by a survey recently conducted by the Edison Company to determine the market for electrical appliances and farm equipment in Edison-served territory.

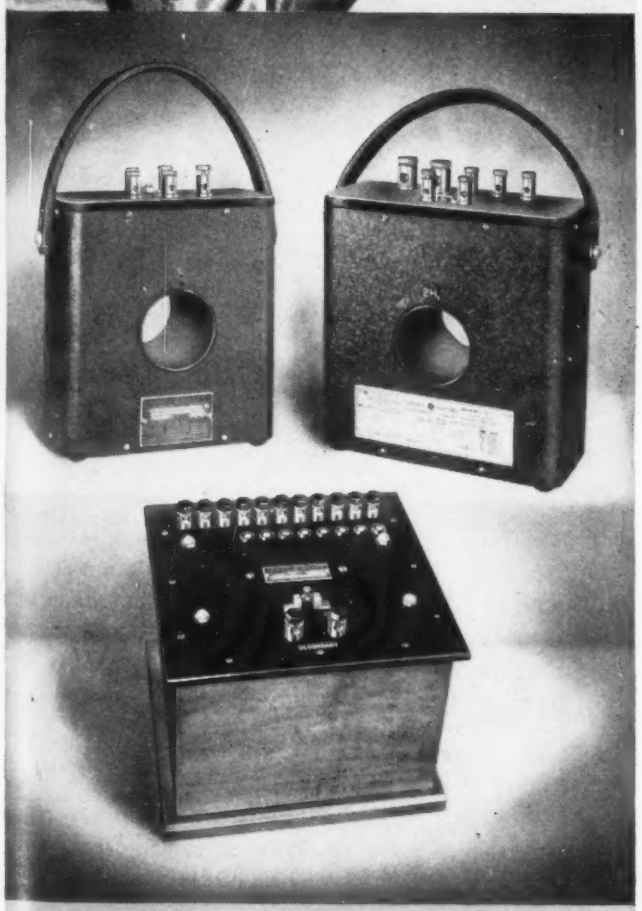
A representative number of Edison's farm customers were asked what new electrical equipment they want to buy when it is available. The results of this survey, when projected to include the entire area served by the Edison Company, show a large market for most types of equipment.

SOUTHERN CALIFORNIA EDISON COMPANY LTD.

ELECTRICAL WEST (with which is consolidated The Journal of Electricity), October, 1945. Vol. 95, No. 4. Published monthly by the McGraw-Hill Company of California, 68 Post Street, San Francisco, 4, Calif. Entered as second class matter at the post office at San Francisco under the Act of March 3, 1879. Additional entry as second class matter at the post office at Los Angeles. Printed in U. S. A. Subscription rates—U. S., U.S. Possessions and Latin American Republics: $2, 1 year; $3, 2 years; $4, 3 years. Canada: $2.50, 1 year; $4, 2 years; $5, 3 years. Other countries: $3, 1 year; $5, 2 years; $6, 3 years. Single copy, 25c. Copyright, 1945. McGraw-Hill Company of California. All rights reserved.

Announcing 3 NEW Portable INSTRUMENT TRANSFORMERS

They're LIGHTWEIGHT
MULTIRANGE
ACCURATE



JP-2 JP-4 JP-3

FOR FIELD TESTING OR LABORATORY USE— Types JP-2 and JP-3. Their accuracy is class 0.3 with burdens B-0.1 to B-0.5 at 60 cycles. Having both the wound-primary and the through-window-type construction, they cover a range of 10 to 2500 amperes. A wide variety of ratings can be obtained by passing the conductor through the window two or more times.

FOR THE HIGHEST-GRADE LABORATORY STANDARD WORK—Type JP-4. The ratio and phase-angle errors in this transformer are negligible. It is of the wound-primary construction with taps in the primary coil for ratings of 0.25 to 60 amperes. Fuses protect the low-rated primary coils, and the secondary is provided with a Thyrite* protector.

These three types are the latest additions to our line of portable instrument transformers. The complete line includes current transformers for ratings of 0.25 to 2500 amperes, and potential transformers for 240 to 4800 volts.

For further information on portable instrument transformers to meet your field or laboratory requirements, write to the nearest G-E office or to Apparatus Dept., General Electric Company, Schenectady 5, N. Y.

*Trade-mark reg. U.S. Pat. Off.

INSTRUMENT TRANSFORMERS

HEADQUARTERS FOR ELECTRICAL MEASUREMENT

GENERAL ELECTRIC

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ELECTRICAL WEST

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Cover photo: Wholly owned plant of the Aluminum Co. of America at Vancouver, Wash.

CHANGE OF ADDRESS

Circulation Manager,
Electrical West,
68 Post St.,
San Francisco 4, Calif.

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From .....

To .....

Signed .....

This Issue

Three business and industrial outlook articles give a good picture of reconversion up and down the Pacific Coast. The first on page 82, by David B. Simpson, secretary of the Northwest Planning Commission, deals with the Pacific Northwest. *Coming San Francisco Bay Way*, page 86, is the title under which Robert C. Elliott, industrial editor of the San Francisco *News* tells of the renaissance the Bay region is undergoing. O. K. Buck, manager industrial section of the Los Angeles Department of Water and Power, discusses reconversion problems in southern California on page 90. Electrical installation at Trentwood, page 94, is described by E. M. Johnson, General Electric engineer, Seattle. G. N. Hawley, manager industrial sales, Southern California Edison Co., takes a realistic view of high-frequency heating potentialities on page 98, while E. W. Morris, manager of the engineering service division, Westinghouse, Los Angeles, describes facilities for developing new high-frequency heating applications on page 101. Significance of hydraulic log barking by J. H. Pestalozzi, regional engineer, Allis-Chalmers, on page 103, and details of modernizing electrically at Mill B of Weyerhaeuser's Everett plant, by K. L. Watts, chief electrician, page 107, round out this special industrial section.

Elsewhere in the issue are the second article on welding by C. A. Rowley, Thermador; a story on recapping with electricity; discussion of wiring adequacy; Utah Power's dealer survey, and suggestions for store modernization.

Preview

The Sales Guide, published the first year of the war as a business guide and suspended for the duration in January 1943, will reappear in the November issue. Engineering features next month will be an article by O. B. Falls, Jr., entitled *Distribution System Economics* and describing the economies effected by use of regulators and shunt capacitors on lines in light load areas, and a story on a heat storage system for house heating. In addition there will be the regular departments and news of the industry and its people.

A million letters

come to her from women each year

Betty Crocker

Betty Crocker's mail floods in from every corner of America . . . asking advice . . . expressing gratitude . . . revealing a depth of loyalty, friendship and confidence that is a potent selling force.

Through this correspondence . . . through her radio program, the oldest on the networks today . . . through constructive services to homemakers . . . Betty Crocker as the personalized representative of the General Mills Home Service Staff has won a place in millions of lives as the best known, most helpful home service authority in the world . . . has helped win the tremendous sales volume of 400,000,000 packages of General Mills products last year.

The loyalty Betty Crocker has generated . . . the friendship and confidence she has inspired, offer a rich pre-sold and ever-widening market to General Mills appliances and housewares dealers . . . hold promise of constantly growing profit possibilities for you.

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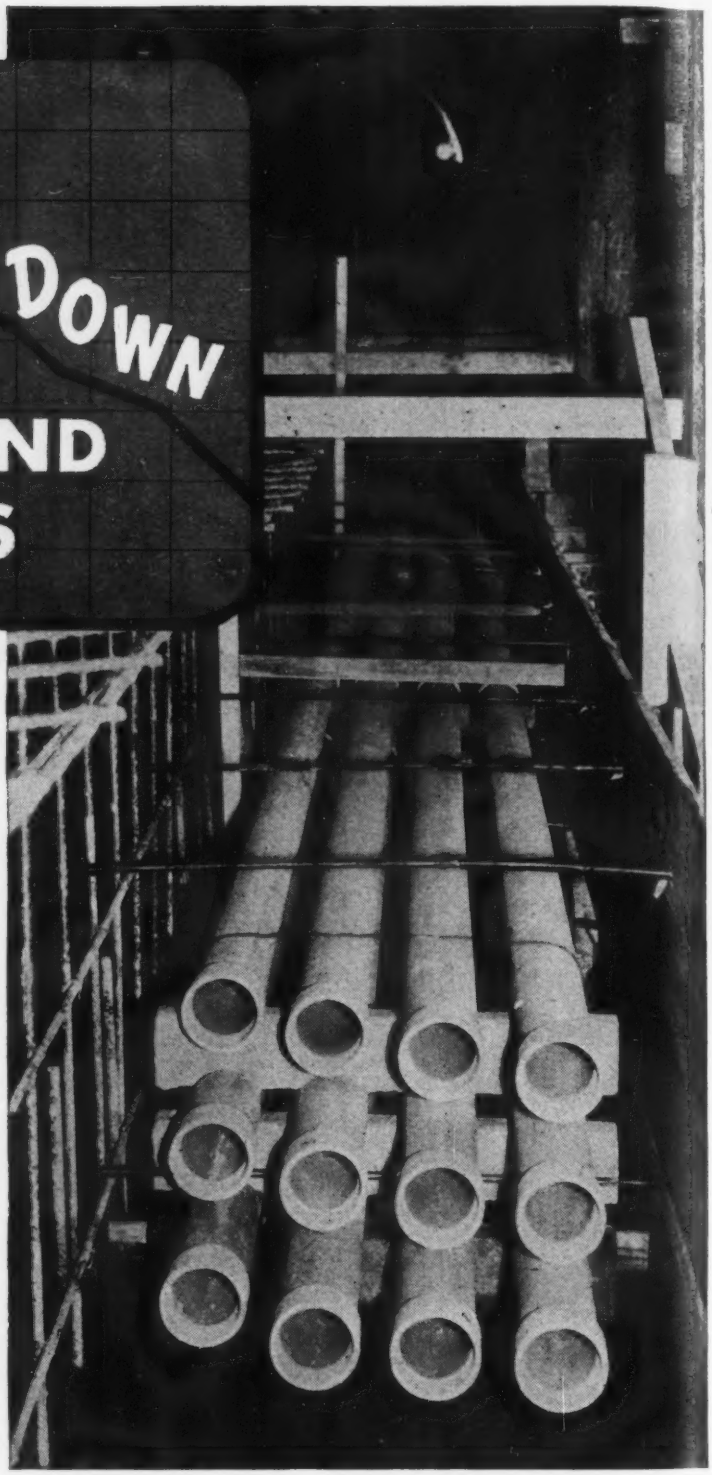
Count on a great family of home appliances and housewares...distinctive in design...exclusive in principle . . . each with patented features that mean new usability and extra value to consumers. Count on powerful advertising, alert merchandising, sound selling. Count on vigorous support for dealers. Count on profits!

BETTY CROCKER IS A REGISTERED TRADE MARK OF GENERAL MILLS, INC.

GENERAL MILLS, INC., HOME APPLIANCE DEPARTMENT • MINNEAPOLIS 13, MINNESOTA

UPKEEP GOES DOWN with these UNDERGROUND CABLEWAYS



These 5 advantages of TRANSITE DUCTS assure low maintenance

1. *Permanently smooth bore*... long cable pulls and replacements are made easy. Danger of damage to cables is minimized.

2. *Easily and quickly installed*... long, lightweight lengths and simple assembly method assure rapid, economical installation.

3. *Inorganic*... made of asbestos and cement compressed under great pressure. This provides permanence and strength... makes these ducts immune to rust and rot.

4. *Immune to electrolysis*... being entirely inorganic and non-metallic, Johns-Manville Transite Ducts are not affected by electrolysis or galvanic action.

5. *Incombustible*... won't contribute to the formation of dangerous smoke, gases, or fumes. If burnouts do occur, these inorganic ducts provide maximum protection to adjacent cables and permit easy removal of damaged conductor.

For full details on J-M Transite Ducts, write for Data Book DS-410, Johns-Manville, 116 New Montgomery St., San Francisco, Cal.

TRANSITE KORDUCT *above*—for installation in concrete. Thinner-walled but otherwise identical with Conduit.

TRANSITE CONDUIT—for exposed work and for use underground without a concrete encasement.

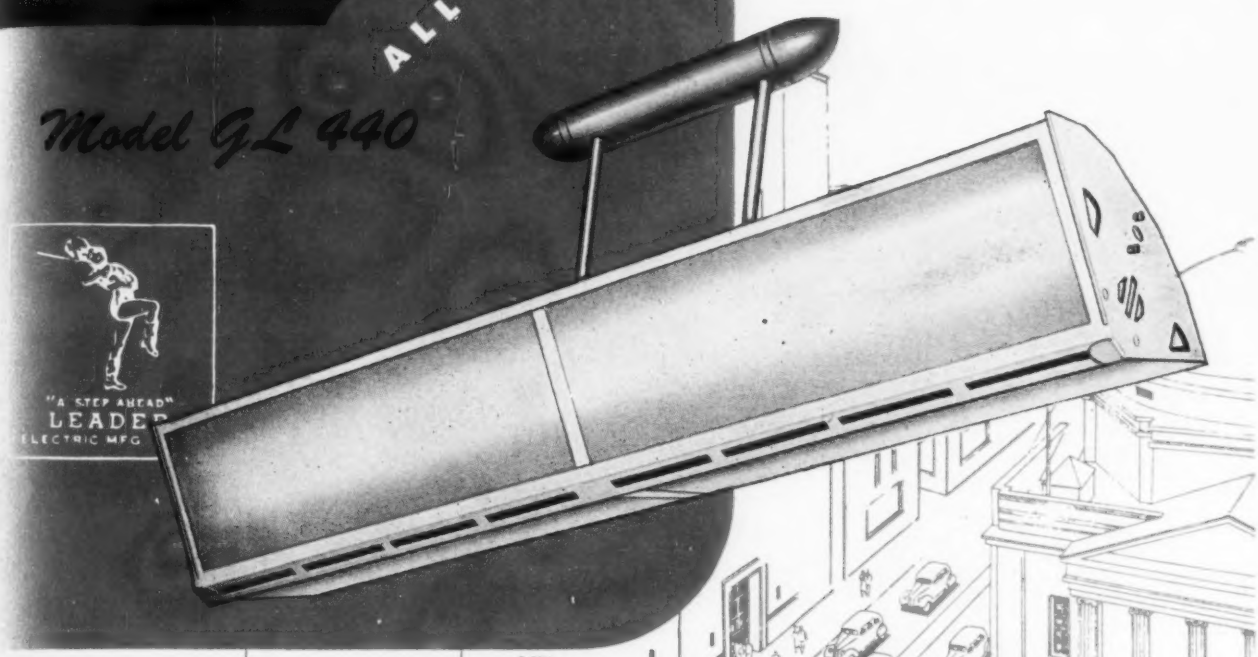
Johns-Manville

TRANSITE DUCTS

JOHNS-MANVILLE JM PRODUCTS

Leader ALL PURPOSE COMMERCIAL FIXTURE

Model GL 440



a fluorescent fixture for *Main Street*

Designed for offices, stores, institutions . . . from Main Street to Broadway.

The Leader GL 440 is adaptable to a wide variety of installations, particularly, offices, drafting rooms, schools, stores, banks and other institutions.

A four light glass enclosed unit with a simple concise design, the Leader GL 440 lends itself to modern trends in architecture and lighting.

A hinged panel with snap fasteners is provided to facilitate relamping and servicing. Easy to install either in individual or in continuous run, flush mounted or hung from stems and canopies.

★ post war lighting *Now!*

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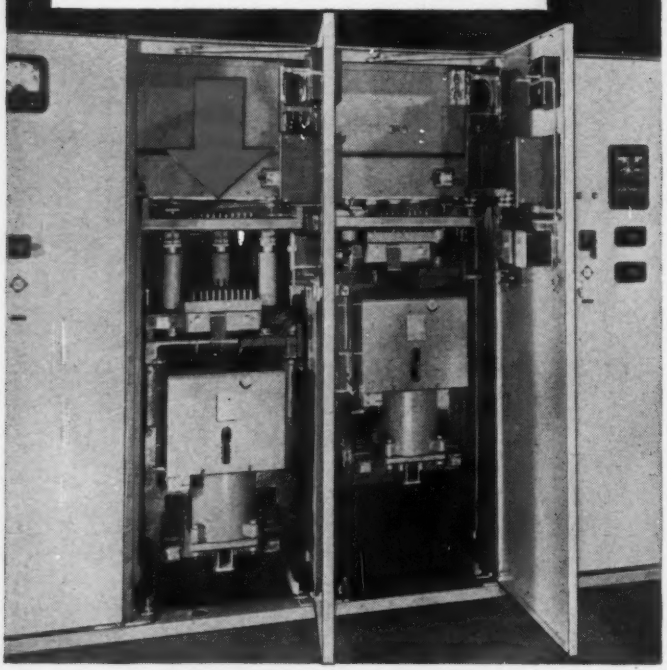
WEST COAST FACTORY: 2040 Livingston Street, Oakland 6, California

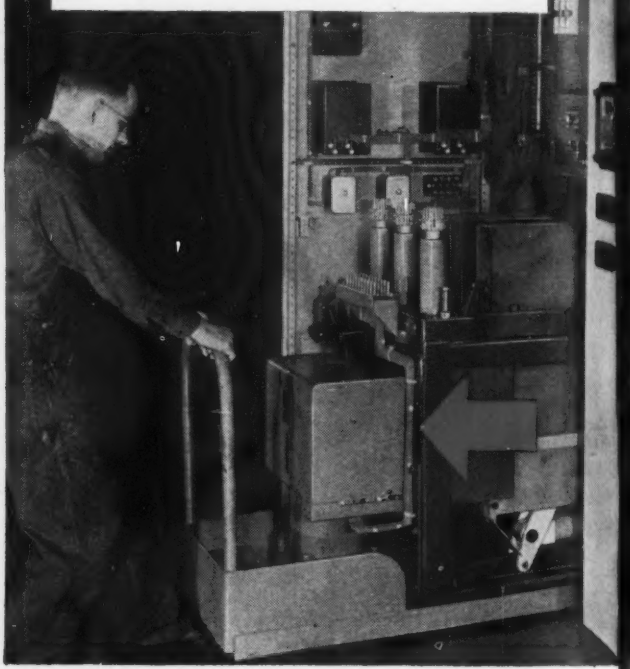
Breaker Inspection

LOWER RUPTAIR CIRCUIT BREAKER



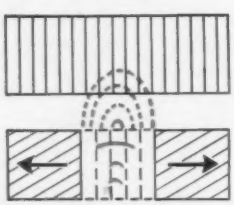
1 **PHOTO SHOWS "Ruptair" magnetic air circuit breaker in normal operating position (at right) and in the lowered disconnect position. The breaker is easily lowered with a manually or electrically operated crank-hoist.**

...WITHDRAW IT



2 **IN DISCONNECT position, "Ruptair" breaker can be put on a transfer truck, and pulled into the aisle. For safety, shutters used to isolate primary disconnect contacts are automatic in operation.**

Principle of Horizontal Contact Separation



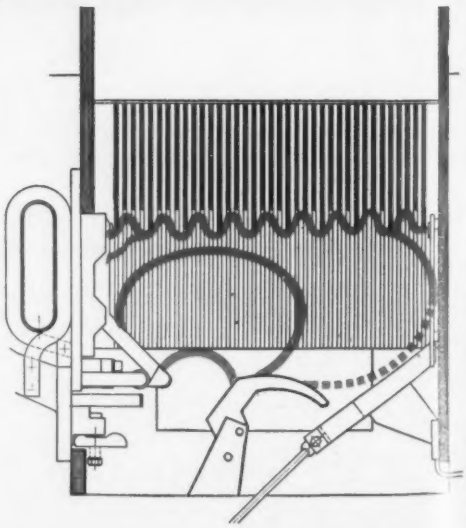
SINCE ARCING contacts on a "Ruptair" circuit breaker are separated in the horizontal direction, natural thermal effect assists the arc into the arc chute . no complex interrupting structure is required! Position of the arc chute *above* contacts simplifies maintenance.

"Ruptair" Magnetic Air Breaker Has Unique Design

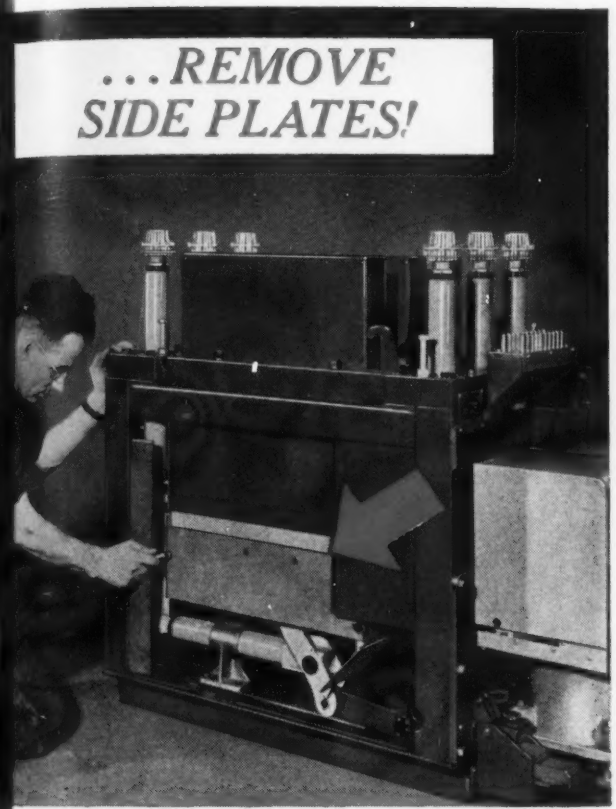
THE RUPTAIR breaker depends for its high efficiency throughout interrupting range on several exclusive design features. One is coordination of contacts and arc runners, so that the arc is quickly transferred from the horn-shaped moving contact to the opposite stationary arc runner.

Another unusual feature is the full establishment of a magnetic field in the breaker before contact separation.

The arc chute is designed to diffuse and cool the heated gases in the arc stream, for rapid arc interruption.



Cut to 3 Easy Steps



3 **FINALLY, light-weight insulating barriers are removed, simply by loosening two cap-screws on each barrier. Since the arc chute is located above the contact structure, it need not be disturbed for contact inspection.**

IN ADDITION to the inherently *low maintenance* requirements of *any* oilless circuit breaker, the "Ruptair" magnetic air breaker offers unusual simplicity of scheduled inspection, as graphically demonstrated here. The "Ruptair" oilless breaker is increasingly popular among operators for moderate capacity installations, 5 kv and below. Fire hazard is reduced . . . many more repetitive operations are possible . . . there's little danger from breaker failure. The "Ruptair" circuit breaker is the *only* magnetic air breaker combining vertical lift construction with horizontal contact separation, illustrated on opposite page. Write ALLIS-CHALMERS, MILWAUKEE 1, WIS.

Allis-Chalmers
MILWAUKEE

THE CUSTOMER STILL "CALLS THE TUNE"

Allis-Chalmers Offers All 3 Types of Circuit Breakers

☛ Allowing the customer unrestricted choice from among the three basic types of indoor circuit breakers is an Allis-Chalmers switchgear policy.

☛ Our engineers are aware that superior merit in the application of a magnetic air breaker, oil circuit breaker, or air blast breaker, depends largely upon the specific requirements.

☛ Furthermore, Allis-Chalmers believes that the *user* of the equipment, through his intimate knowledge of actual operating conditions, is the logical one to decide which breaker is best for him.

☛ A military analogy: When changes were contemplated in the design of medium bombers, after the first daring American air raid on Tokyo in 1942, it was the men who had taken part in the mission who were consulted. They had been flying the bombers, fighting in them, and they knew the requirements!

☛ Similarly, by offering all three types of circuit breakers for unrestricted buyer choice, Allis-Chalmers insures that the informed *customer* will "have his say" in the logical evolution of tomorrow's circuit breaker.

A 1864

Water is a SABOTEUR

Ever since the first insulated cables were made water has been the arch-enemy of dependable operation. Before the war Simplex developed and produced Simplex-ANHYDREX deproteinized rubber insulation. Now Simplex has developed a new ANHYDREX insulation made from specially treated and compounded Buna rubber.

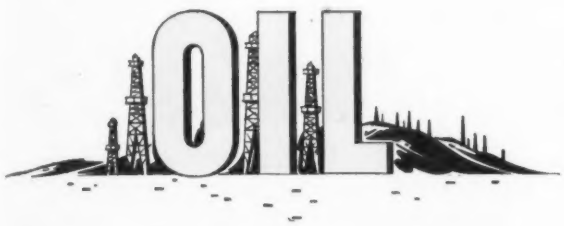
This new ANHYDREX insulation has a water absorption rate of only 20 milligrams per square inch of exposed surface. That is far ahead of anything that was dreamed of a few years ago with synthetic rubber.

If you have a submarine cable or an underground power cable problem, let the Simplex Sales Engineers show you how ANHYDREX rubber insulation can save money and make a more satisfactory installation for you

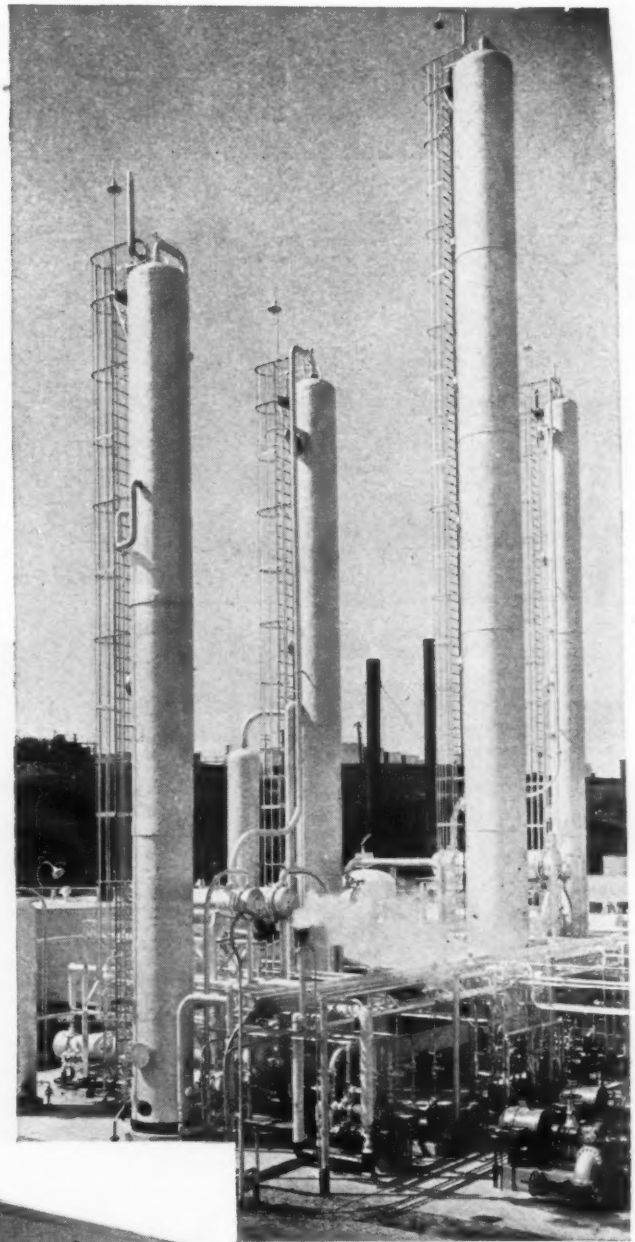
Simplex Wire & Cable Co., 79 Sidney Street, Cambridge 39, Mass.

Simplex WIRES and CABLES

SQUARE D AND THE NATION'S INDUSTRIES



A billion dollar industry looks to SQUARE D for electrical *Precision* control . . .

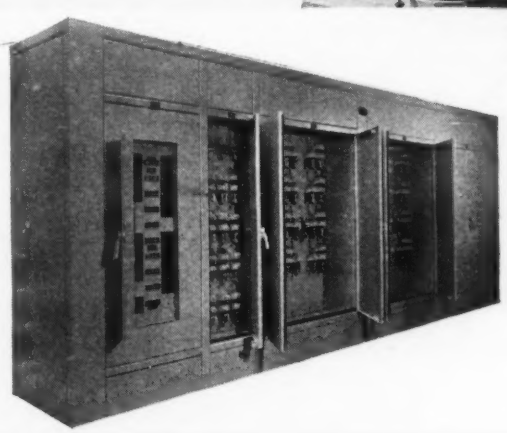


100 Octane Aviation Gasoline is *not* a single component product as many believe, but the combination of many scientific blending and refining processes, each step of which calls for exacting *electrical precision control.*

It is no wonder that Square D Electrical Control Equipment is at work the length and breadth of the Oil Refinery world. Oil experts and refinery engineers from California to the Dutch East Indies accept Square D as one of the finest examples of sound engineering, precision workmanship and correct design in electrical control equipment the world over.

Especially valuable to the refining industry is the Square D Control Board which coordinates the intricate development processes from crude oil to the finished product, helping to meet rigid specifications in producing iso-butanes for alkylation and the normal butanes for motor fuel.

No matter in what category or industry your electrical problems may fall, a call to your nearest Square D Engineer or Distributor will bring expert counsel and assistance in solving both your immediate and long range problems.



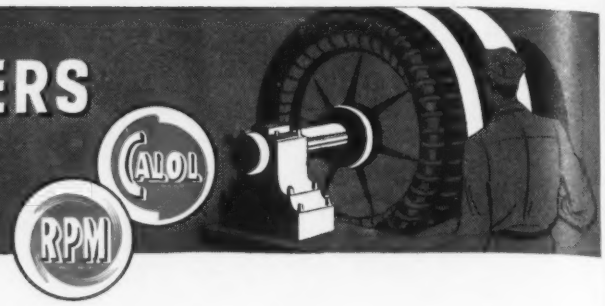
(ABOVE) *One of the many typical alkylation processing plants in operation on the west coast.*

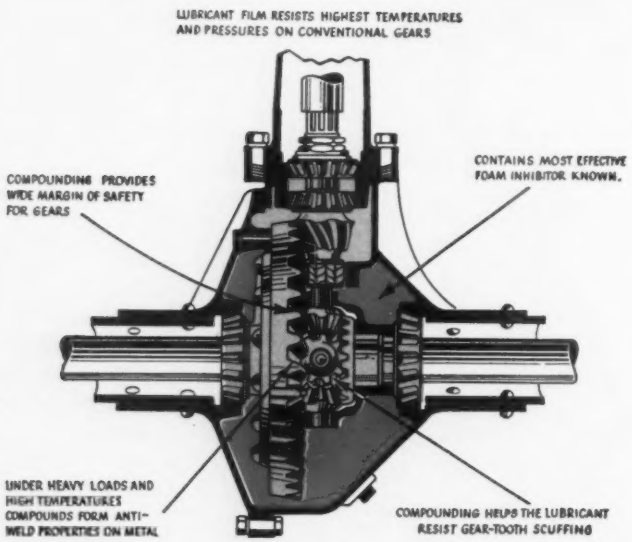
(LEFT) *Square D Control Board in the Standard Oil Butadiene Processing Plant at El Segundo, California.*

SQUARE D COMPANY

LOS ANGELES 21 SAN FRANCISCO 3 • SEATTLE 1 • DENVER 4 • DETROIT 11 • MILWAUKEE 2

STANDARD ENGINEERS NOTEBOOK




LUBRICANT FILM RESISTS HIGHEST TEMPERATURES AND PRESSURES ON CONVENTIONAL GEARS
COMPOUNDING PROVIDES WIDE MARGIN OF SAFETY FOR GEARS
CONTAINS MOST EFFECTIVE FOAM INHIBITOR KNOWN.
UNDER HEAVY LOADS AND HIGH TEMPERATURES COMPOUNDS FORM ANTI-WELD PROPERTIES ON METAL
COMPOUNDING HELPS THE LUBRICANT RESIST GEAR-TOOTH SCUFFING

Inhibitor prevents excessive lubricant foaming

Because it contains the most effective foam inhibitor known, RPM Gear Lubricant (Compounded) will not foam excessively even when low atmospheric temperatures increase its viscosity. This outstanding characteristic relieves many operating problems that annoy truck and bus operators—loss of lubricant by leakage, damage to lubricant seals, brake lining contamination, sludging of lubricant due to oxidation, insufficient gear lubrication, etc.

RPM Gear Lubricant (Compounded) is highly stable. Retaining proper body, it keeps a tough, oily lubricant film on gear tooth surfaces. If, at any time, the oil film in front of meshing teeth is broken, its special compounding prevents welding or scoring.

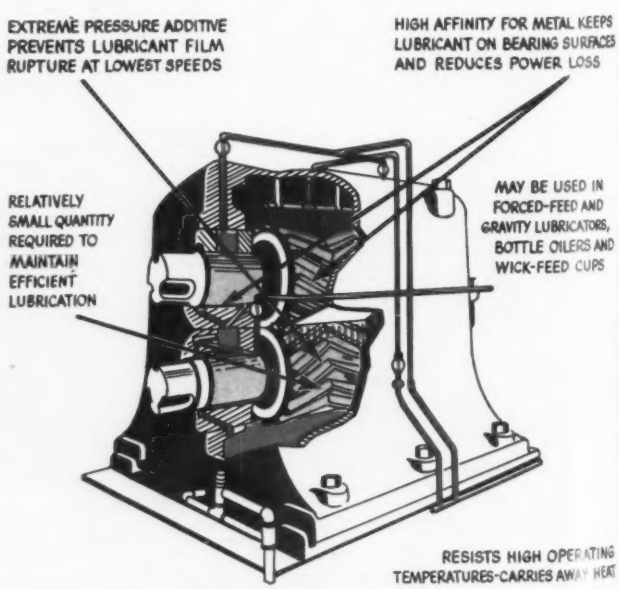
It resists the highest operating pressures and temperatures on all automotive power-transmission gears, except hypoids. It is non-corrosive – an ideal lubricant for bronze worm gears. Comes in four grades: SAE 80, 90, 140, 250.

Vistac gives gears extra protection

As the name "Vistac" implies, Calol Vistac Oils are both viscous and tacky giving them a high affinity for bearing surfaces. An oiliness and extreme-pressure additive provides unusual film strength.

They assure full protection to heavy duty gears, such as industrial reduction sets, on which extreme pressures are exerted over wide areas for a relatively long time. They are extremely efficient. Adequate quantities may be supplied to gears by the usual lubrication methods — forced feed- and gravity-lubricators and sight-feed cups; the lighter grades by bottle-oilers and wick-feed cups.

Calol Vistac Oils are also outstanding for the lubrication of rock drills, hammers and other air tools. They atomize quickly, are stable and uniform, and retain their fluidity at low temperatures. They are made in six grades: 9X (SAE 10), 14X (SAE 20), 19X (SAE 30), 28X (SAE 40), 36X (SAE 40), 45X (SAE 40).


EXTREME PRESSURE ADDITIVE PREVENTS LUBRICANT FILM RUPTURE AT LOWEST SPEEDS
HIGH AFFINITY FOR METAL KEEPS LUBRICANT ON BEARING SURFACES AND REDUCES POWER LOSS
RELATIVELY SMALL QUANTITY REQUIRED TO MAINTAIN EFFICIENT LUBRICATION
MAY BE USED IN FORCED-FEED AND GRAVITY LUBRICATORS, BOTTLE OILERS AND WICK-FEED CUPS
RESISTS HIGH OPERATING TEMPERATURES-CARRIES AWAY HEAT

Standard Fuel and Lubricant Engineers are always at your service. They'll gladly give you expert help — make your maintenance job easier. Call your local Standard Representative or write Standard of California, 225 Bush St., San Francisco 20, California.

FOR EVERY JOB A **STANDARD OF CALIFORNIA** TEST-PROVED PRODUCT

Improved System Stability

during short-circuit or overload with 5-cycle opening of the new Multiflow "De-ion" Grid in the reduced size Type GM oil breakers

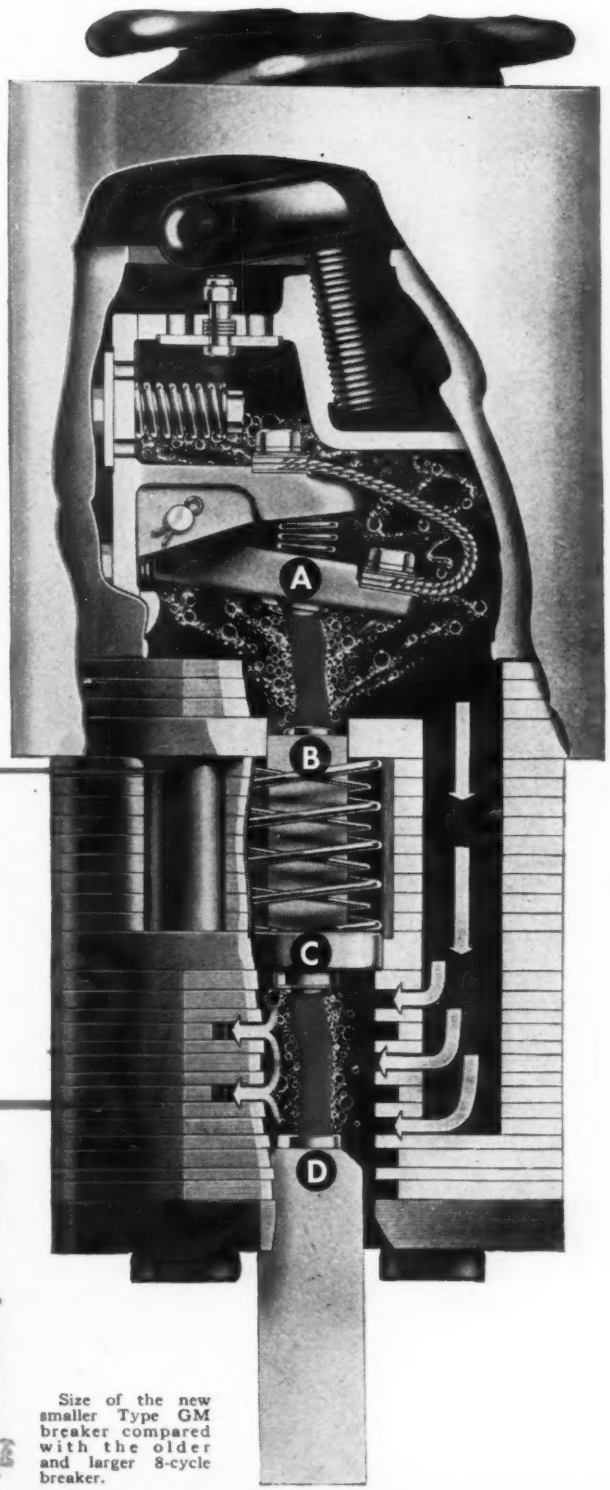
In Westinghouse Type GM oil circuit breakers, the Multiflow "De-ion" action makes possible a new high level performance in a standard line of breakers to again improve stability of power transmission systems.

The Multiflow Grid, another exclusive Westinghouse development, is simple in action. Two pairs of contacts open in quick succession, drawing two arcs in series. The first arc generates gas and produces oil pressure which forces oil through the second arc, and sweeps arc products out of the vents for speedy deionization. Opening is fast—5 cycles—extinction of arc almost instantaneous.

Smaller in size, but with same safety factor, these new breakers require less oil and less oil handling, and smaller foundations compared with older standard 8-cycle breakers. Reduced arc energy means longer oil life—less wear on contacts. Access to grids and contacts is easy—saving maintenance time.

Ratings range from 115 to 230 kv, with interrupting capacity up to 3,500,000 kva.

Get complete information from your Westinghouse office or write for B-3424, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-60603



MULTIFLOW WORKS LIKE THIS...

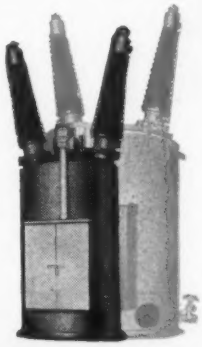
Contacts A and B part first, immediately followed by contacts C and D. Upper arc creates oil pressure, forcing oil through channel indicated by arrows down to compartment containing lower arc. This sweeps arc products out of the vents and produces an extremely high rate of deionization at current zero.

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

TYPE GM

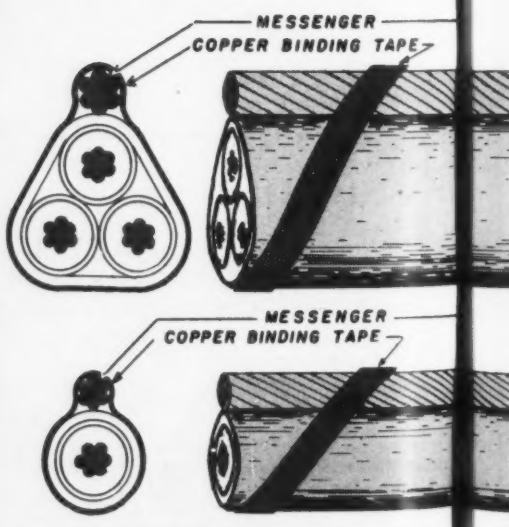
Circuit Breakers



Size of the new smaller Type GM breaker compared with the older and larger 8-cycle breaker.

DEVELOPED FIRST
BY

SELF-Supporting
AERIAL
POWER
CABLE



SELF-SUPPORTING
AERIAL POWER CABLE
2,300—15,000 VOLTS

MANIFEST ADVANTAGES

Factory-assembled complete. Simply draw up to sag. Tree-trimming eliminated. Self-grounded: Safe! Easy to splice, or tap. *Minimize Storm Hazards.*

TIN 1934
YGENERAL CABLE

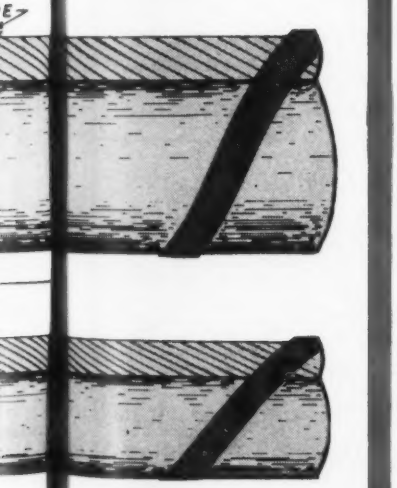
★ Now Available in Latest Improved Constructions and with Benefits of 11 Years' Operating Experience

Installed in our Research Laboratory Proving Ground, the original 1934 product proved itself through nine years' rigorous trial at double working voltage. The first commercial installation was made in 1939. Since then, many miles have been successfully operated throughout the country.

That Aerial Power Cable affords economy in the long run and a most desirable factor of safety against service interruptions and public hazard, and is well recognized particularly where tree conditions prevail. *Up to 65%* labor savings in installations, plus greatly reduced tree-trimming and maintenance costs, have brought the modern General Cable SELF-SUPPORTING Type to the fore.

It eliminates unsightly open wire construction and enhances street appearance materially in both residential and business sections. No tree surgery to mar attractive surroundings.

It is especially adapted to post-war service extensions where underground duct cost is not justifiable. Numerous utility installations bear witness to its notable superiority in mechanical strength and reliability. Great trees which have fallen across these cables, have been cut down and removed, and the cables pulled back to normal sag, totally without interruption of service. Company engineers will be glad to supply complete technical data.



Non-leaded
Light in weight
Gencorone insulation

GENERAL CABLE CORPORATION

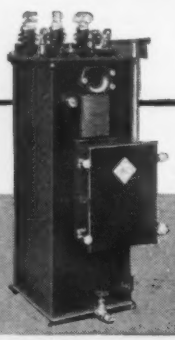
General Cable Corporation Sales Offices are located at Atlanta, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Detroit, Houston, Kansas City (Mo), Los Angeles, New York, Philadelphia, Pittsburgh, Rome (N.Y.), St. Louis, San Francisco, Seattle, Washington (D. C)

COMPARE REGULATORS FOR 2400 V. FEEDERS

Important economies and superior operating characteristics of the 5/8% Step Regulator are explored in the comparison chart below.

FEATURES	INDUCTION-TYPE REGULATOR	ALLIS-CHALMERS 5/8% STEP REGULATOR
Low Exciting Current?	NO Three times that of Step Regulator.	YES A third that of Induction Regulator.
Savings in Initial Price?	NO Both regulators cost the same initially.	NO Regulators cost the same initially.
Investment Economy?	NO High exciting current means kva diverted from revenue-producing loads ...cost of capacitors to balance wattless current is high.	YES Low exciting current means more system kva available for useful loads . . . cost of capacitors to balance wattless current is low.
Quiet Operation?	NO Core slots, rotor bearings, air gap are possible causes of noise.	YES Regulator has no more audio noise than equivalent transformer.
Flexibility of Current Rating?	NO Gives ±10% regulation at rated current and ±5% regulation at double the current value.	YES A-C regulator gives ±10% regulation at rated current, and ±8¾%, 7½%, 6¼% and 5% regulation at higher current values.
Close Regulation?	YES Voltage held within 1% (1 volt). Holding coil adjustments, tendency of motor to overshoot make perfect regulation difficult.	YES Voltage held within ¾ volt by 5/8% step regulation with Feather-Touch control.

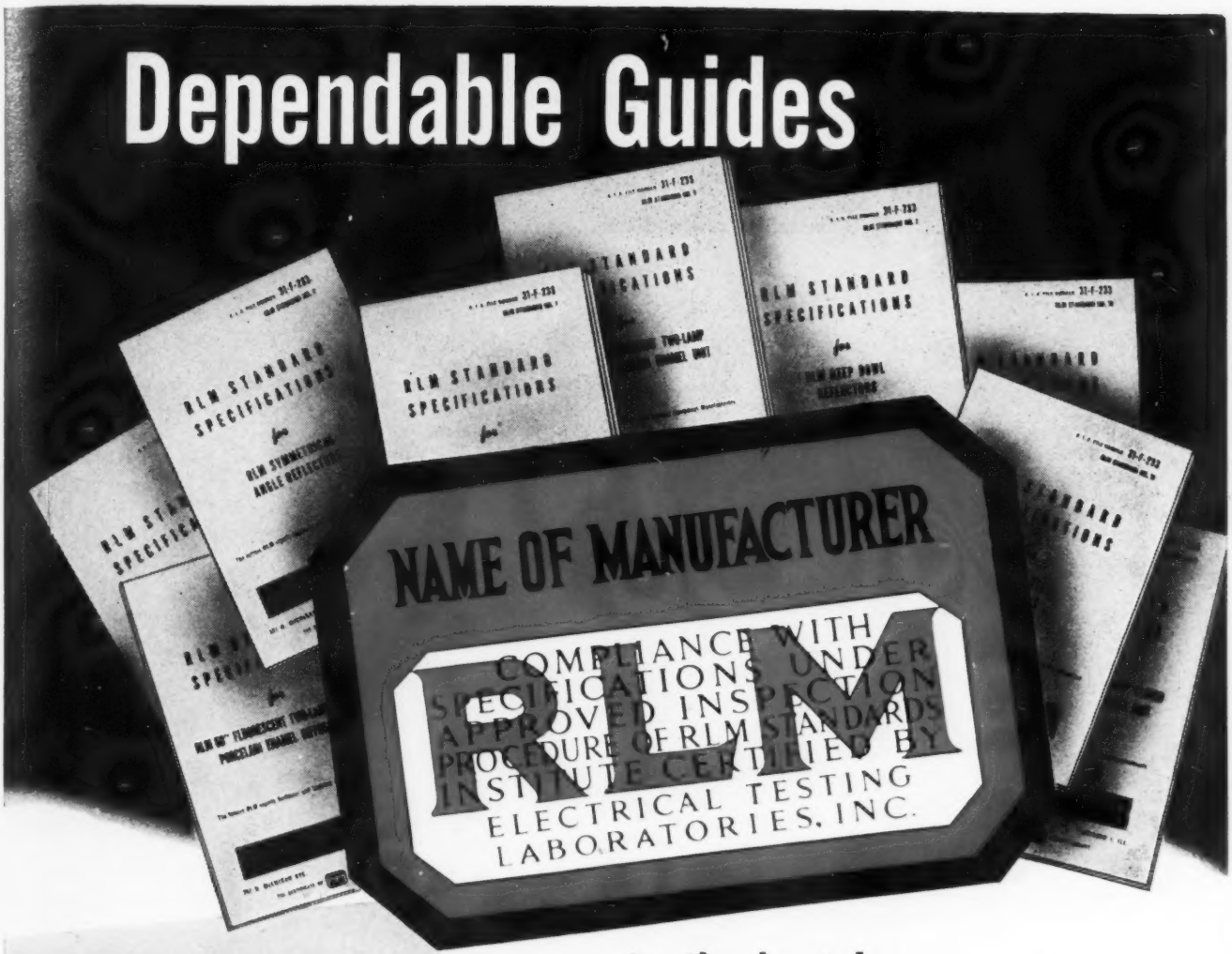
A 1823



Get the full story on the DFR 5/8% Step Regulator for low voltage feeders in Bulletin B-6065, ALLIS-CHALMERS, MILWAUKEE 1, WIS.

ALLIS-CHALMERS *5/8% STEP REGULATORS*

Dependable Guides



RLM STANDARDS INSTITUTE SPECIFICATIONS

RLM Specification No. 1—
Dome Reflector

RLM Specification No. 2—
Deep Bowl Reflector

RLM Specification No. 3—
Symmetrical Angle Reflector

RLM Specification No. 5—
48" Fluorescent Two-Lamp Closed-End Porcelain Enamel Unit

RLM Specification No. 6—
48" Fluorescent Three-Lamp Closed-End Porcelain Enamel Unit

RLM Specification No. 7—
60" Fluorescent Two-Lamp Closed-End Porcelain Enamel Unit

RLM Specification No. 8—
60" Fluorescent Two-Lamp Closed-End Porcelain Enamel Diffuser Unit

RLM Specification No. 9—
48" Fluorescent Two-Lamp Open-End Porcelain Enamel Unit

RLM Specification No. 10—
48" Fluorescent Three-Lamp Open-End Porcelain Enamel Unit

RLM Specification No. 11—
60" Fluorescent Two-Lamp Open-End Porcelain Enamel Unit

RLM Specification No. 12—
60" Fluorescent Two-Lamp Open-End Porcelain Enamel Diffuser Unit

★RLM Specification No. 18—
Glassteel Diffuser.

★New RLM Approved Unit

to the best in
INDUSTRIAL LIGHTING EQUIPMENT

Lighting reflectors that look very much alike may differ greatly as to quality and efficiency. Accurate measurement of these differences at the time of purchase is difficult . . . requires exacting laboratory and engineering tests not readily available to those who purchase and specify lighting equipment.

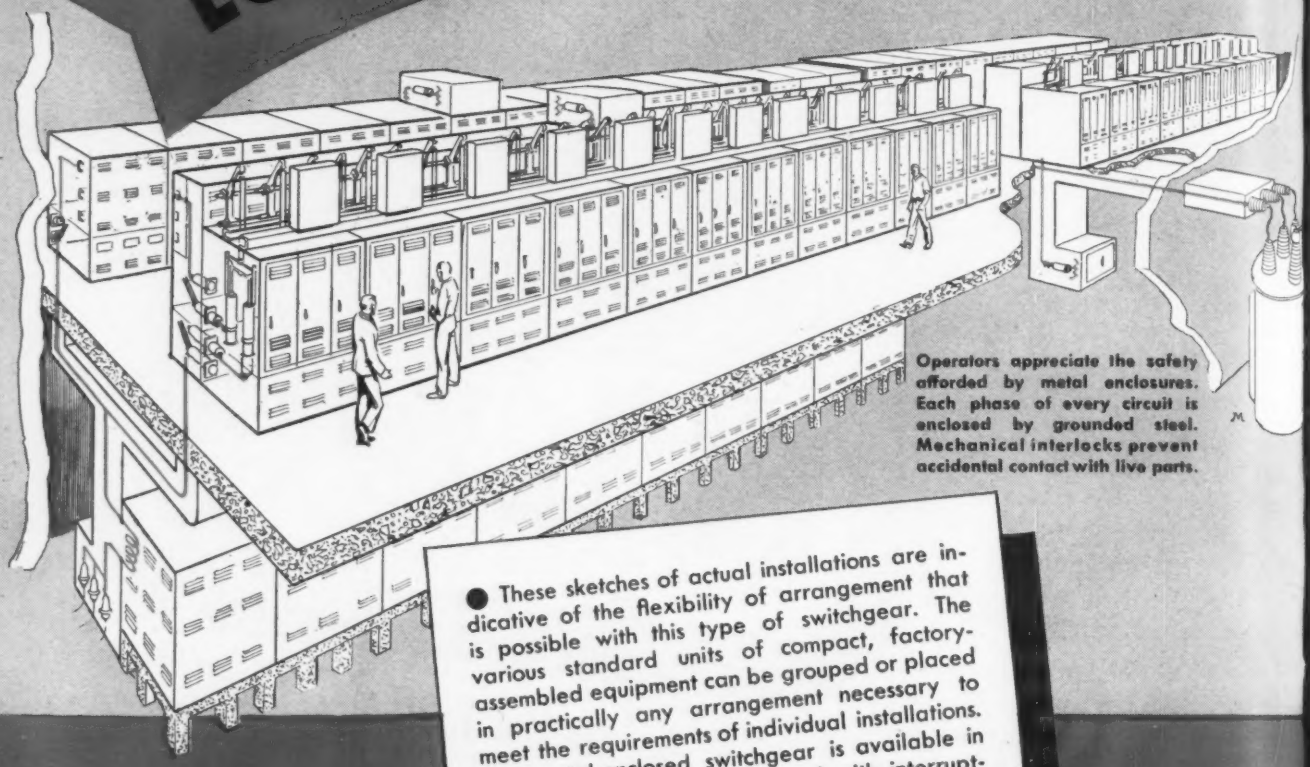
Hence the value of RLM Standard Specifications in establishing basic standards of efficiency, design and quality . . . and the RLM Label to identify lighting equipment built to meet these standards. This label certifies that the industrial lighting equipment on which it is affixed has been manufactured and inspected in compliance with the exacting procedure developed and administered by RLM Standards Institute.

Every RLM specification is drafted by a Technical Committee guided by the findings of the Illuminating Engineering Society, the recommendations of the *Better Light-Better Sight Bureau* and other recognized industry associations. These specifications are available without charge through manufacturers utilizing RLM inspection and certification service, or direct from RLM Standards Institute.

RLM STANDARDS INSTITUTE
INCORPORATED

307 N. Michigan Ave., Suite 420 Chicago 1, Illinois

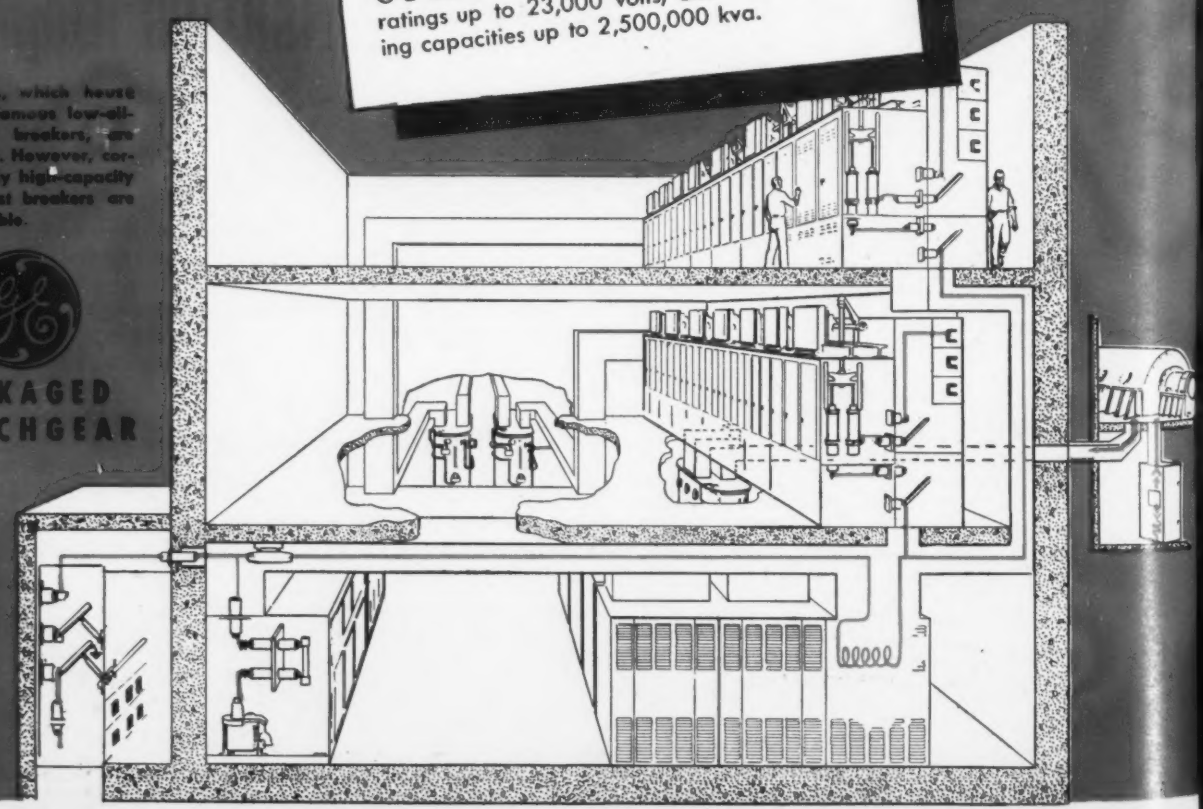
LOOK FORWARD TO THIS



Operators appreciate the safety afforded by metal enclosures. Each phase of every circuit is enclosed by grounded steel. Mechanical interlocks prevent accidental contact with live parts.

● These sketches of actual installations are indicative of the flexibility of arrangement that is possible with this type of switchgear. The various standard units of compact, factory-assembled equipment can be grouped or placed in practically any arrangement necessary to meet the requirements of individual installations. G-E metal-enclosed switchgear is available in ratings up to 23,000 volts, and with interrupting capacities up to 2,500,000 kva.

FH cubicles, which house the justly famous low-oil-content FH breakers, are shown here. However, correspondingly high-capacity G-E air-blast breakers are also available.



PACKAGED SWITCHGEAR

TYPE OF SWITCHGEAR

Installed Cost Definitely Predictable!

THE basic units of G-E metal-enclosed switchgear, like letters of the alphabet, can be combined in literally thousands of practical arrangements. This versatility enables you to meet any reasonable set of requirements without resorting to "specials."

You get the manifold benefits of standardization and repetitive manufacture

By selecting standard, packaged switchgear and associated apparatus, you avoid the detailed engineering and drafting of minor equipment. You get the assurance of proper operation, because the complete equipment is factory-assembled and tested—equipment that is approved by users throughout the world.

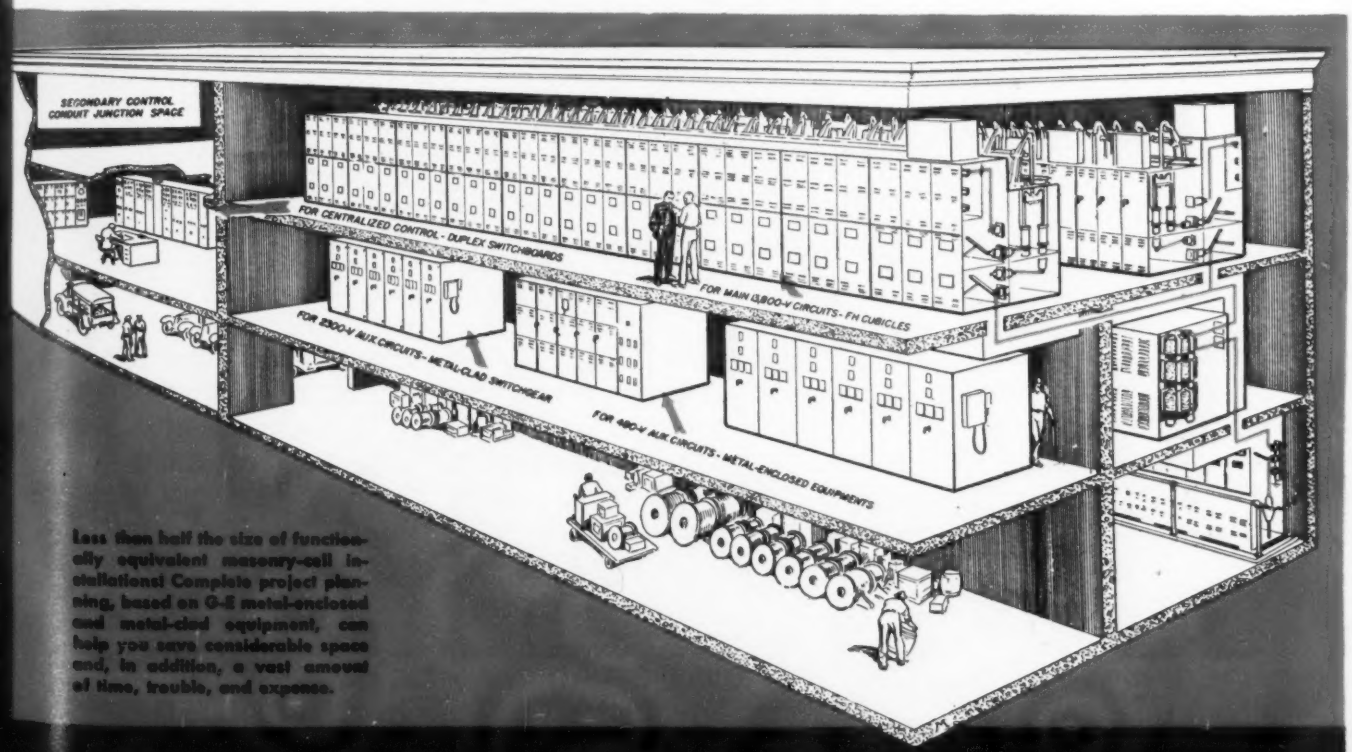
Installation of this type of equipment is always much easier, faster, less of a manpower problem, and less costly than on-the-spot piecemeal installations. Standard, metal-enclosed units are delivered in complete sections—need only to be fastened in place and connected.

One responsibility insures two important extras

When you place the responsibility for your entire installation with one reliable manufacturer, you automatically eliminate a vast amount of detail and clerical work. In addition, you are assured that the equipment you select will be co-ordinated at the factory in *three* ways: electrically, mechanically, and physically. You get matched equipment that not only works properly but looks right.

Ask your G-E representative for complete information on factory-assembled, ready-to-install primary-switchgear equipments. *General Electric Co., Schenectady 5, New York*

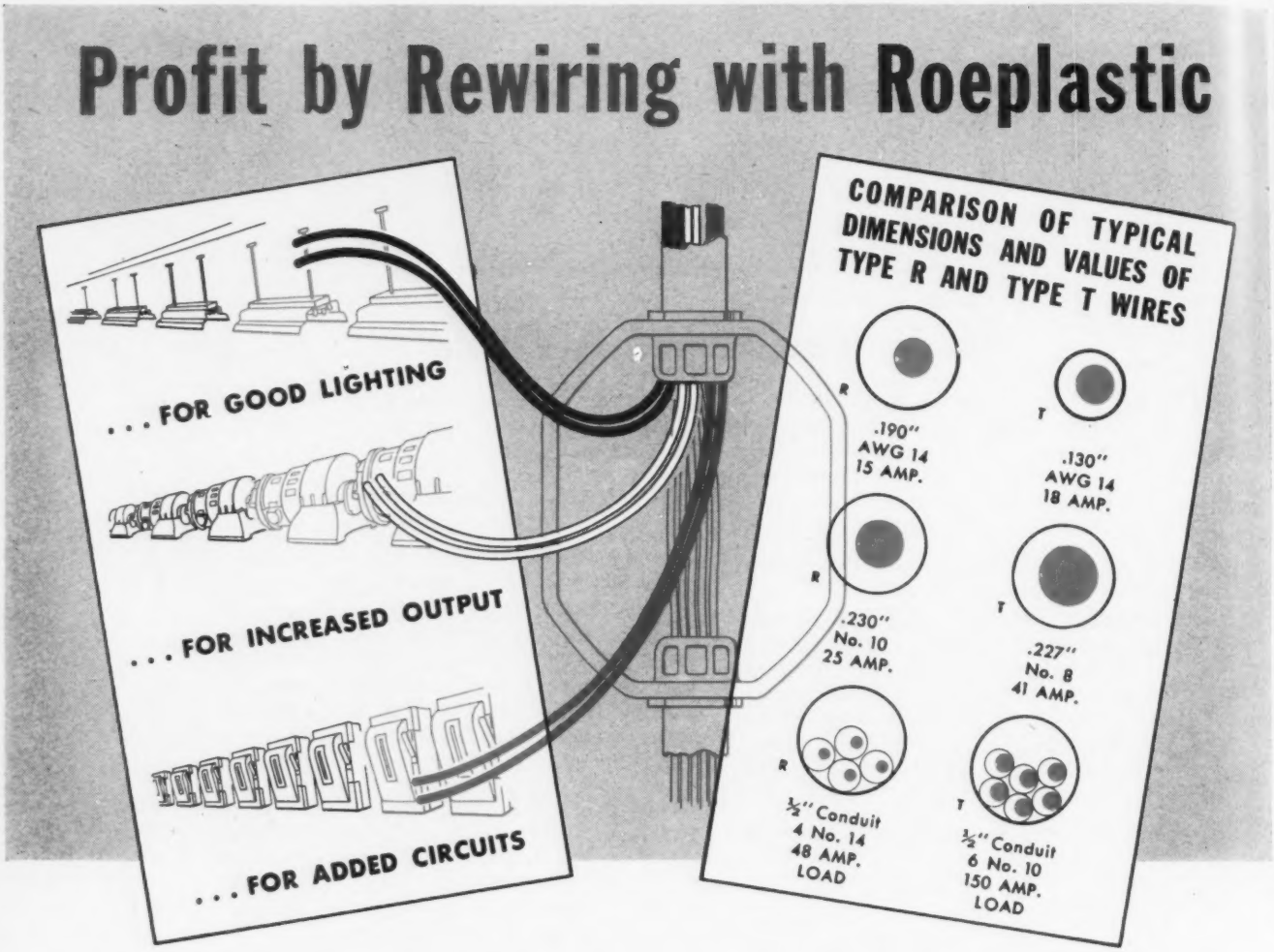
Buy all the BONDS you can—*and keep all you buy*


SECONDARY CONTROL CONDUIT JUNCTION SPACE
FOR CENTRALIZED CONTROL - DUPLEX SWITCHBOARDS
FOR MAIN 13,800-V CIRCUITS - FH CUBICLES
FOR 2300-V AUX. CIRCUITS - METAL-CLAD SWITCHGEAR
FOR 480-V AUX. CIRCUITS - METAL-ENCLOSED EQUIPMENTS

Less than half the size of functionally equivalent masonry-cell installations! Complete project planning, based on G-E metal-enclosed and metal-clad equipment, can help you save considerable space and, in addition, a vast amount of time, trouble, and expense.

GENERAL ELECTRIC

Profit by Rewiring with Roeplastic


. . . FOR GOOD LIGHTING
. . . FOR INCREASED OUTPUT
. . . FOR ADDED CIRCUITS
COMPARISON OF TYPICAL DIMENSIONS AND VALUES OF TYPE R AND TYPE T WIRES
R
.190" AWG 14 15 AMP.
T
.130" AWG 14 18 AMP.
R
.230" No. 10 25 AMP.
T
.227" No. 8 41 AMP.
R
½" Conduit 4 No. 14 48 AMP. LOAD
T
½" Conduit 6 No. 10 150 AMP. LOAD

Roeplastic, replacing ordinary Type R in rewiring, permits use of *more* or *larger* conductors, and a greater area of conduit fill. With this Roebling thermoplastic thin wall wire, not only does the amount of copper pulled through increase, but also the permissible operating temperature. Load capacity increases as high as 300% may be had! The cost of rewiring can well be offset by the savings from increased output.

Add to these advantages the superior properties of the free-stripping, synthetic insulation: high resistance to oil, chemicals, moisture, flame. It has excellent tensile strength, and will pull through conduit easily and without abrasion. Standard colors permit easy circuit coding.

Roeplastic (600 volt–60° C) is furnished in solid conductor, size 14 to 8 A.W.G., and stranded, 14 to 6 . . . type T for dry locations, TW for wet locations. Quantities will shortly be available for non-priority users. Write for details.

JOHN A. ROEBLING'S SONS COMPANY
OF CALIFORNIA
San Francisco • Los Angeles • Seattle • Portland

ROEBLING WHOLESALERS, *always giving the best in service, can fill your needs in Roeplastic . . . and Roebling's other fine electrical wires and cables too.*

ROEBLING

WEATHERPROOF WIRE • SERVICE ENTRANCE CABLES • RUBBER COVERED WIRES AND CABLES (INCLUDING THIN-WALL INSULATED BUILDING WIRES AND CABLES) • RUBBER INSULATED POWER CABLES • PIGTAIL AND BRAIDED COPPER • TELEPHONE WIRES • RUBBER SHEATHED PORTABLE CABLES • BARE COPPER STRAND • MAGNET WIRE • VARNISHED CAMBRIC POWER CABLES • TROLLEY CONTACT WIRE

PACEMAKER IN WIRE PRODUCTS

THESE MOTORS THRIVE ON SA35

IN OUR OPINION, "National" Grade SA35 carbon brushes outperform all other grades on D.C. general purpose and heavy duty motors whether they be in mine, mill, shop or factory —on lathes, pumps, fans—on numerous industrial applications.

This brush, from the very day that it was introduced, has proven more and more dependable chiefly because of its commutating ability, uniformity in brush life and operating economy. For that reason we say—These Motors Thrive . . . On SA35.

Also adapted to heavy duty D.C. generators and rotaries and to reversing and continuous mill drives, grade SA35 is recommended as well for A.C. commutating type single phase and polyphase motors and repulsion-induction motors. Also for welding generators.

If you are not using "National" Grade SA35 on such equipment, we urge you to try it and learn at first hand of its most important feature—its *dependability.*

The word "National" is a registered trade-mark of National Carbon Company, Inc.

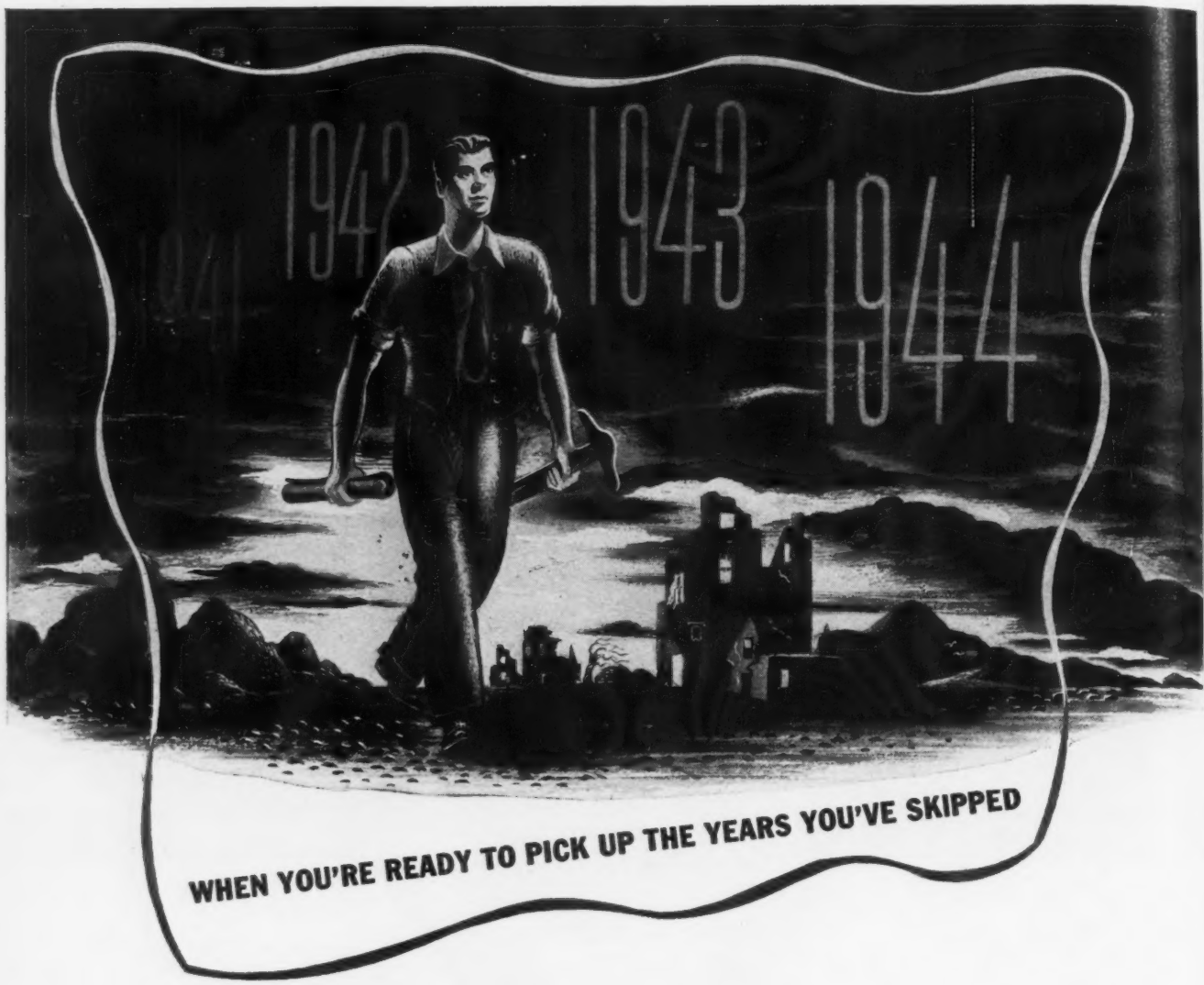
NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide and Carbon Corporation

UCC

General Offices: 30 East 42nd Street, New York 17, N. Y.

Division Sales Offices: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco



WESTON CAN TELL YOU LOTS

That's NEW about Sensitive Relays!

Many engineers concentrating on specialized wartime problems have had little opportunity to keep posted on all new developments in the electrical field. Many of these developments, too, could not previously be revealed for security reasons.

But now, with civilian activities in closer sight, these engineers will want to find out how far electrical science has moved forward in the years they have skipped.

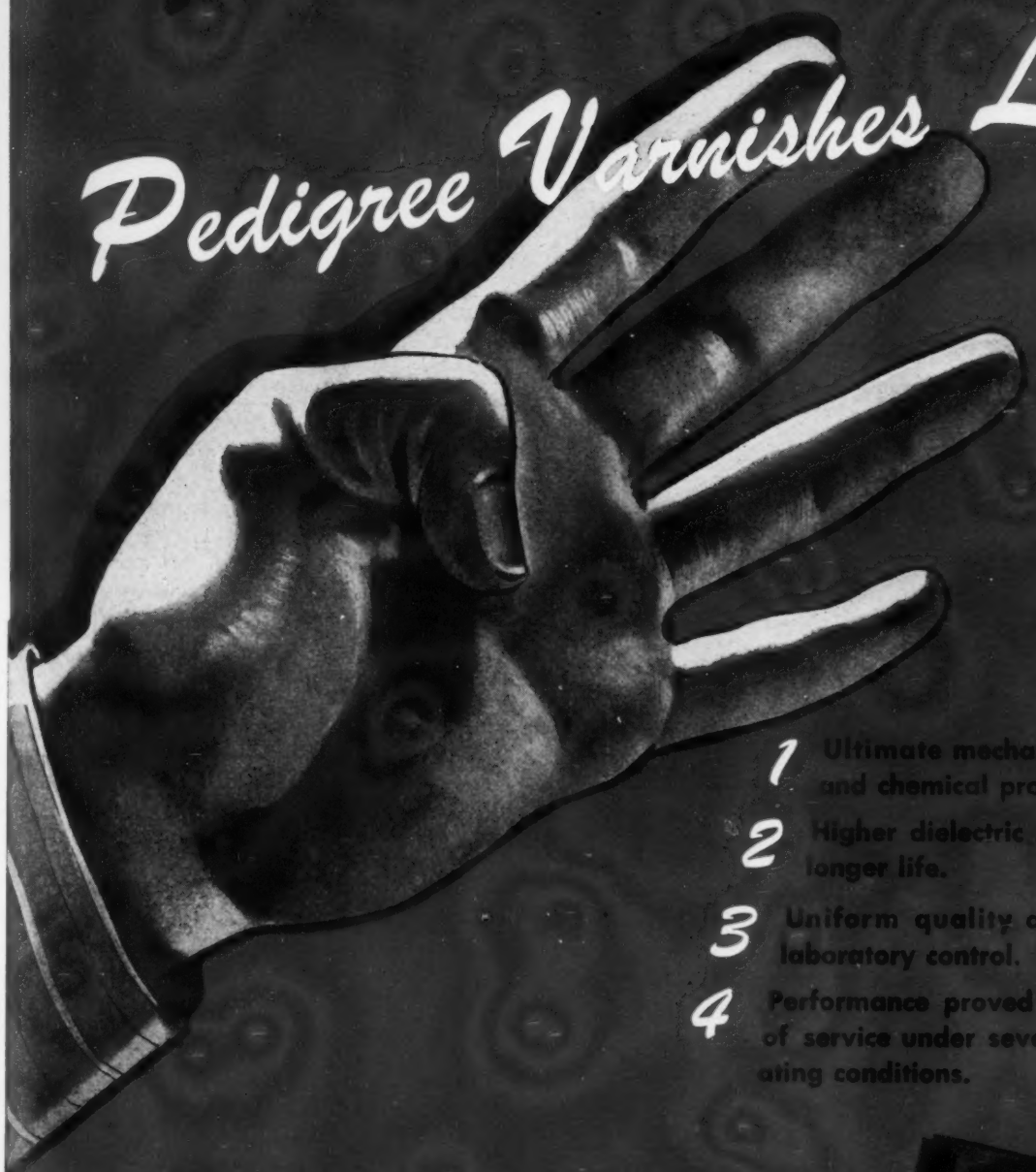
In sensitive relays, for example, much has happened which will be of vital importance to design engineers. New sensitivities have been achieved by WESTON . . . making available relays that provide positive control on extremely minute quantities of electrical energy. New compactness has been achieved, too; overcoming former space limitations through extremely small-size and light-weight.

To make sure that your post-war products, or manufacturing processes, are not handicapped by lack of knowledge about these new sensitive relay developments, ask the WESTON representative in your vicinity to quickly bring you up-to-date. Or, write direct to . . . Weston Electrical Instrument Corporation, 577 Frelinghuysen Avenue, Newark 5, New Jersey.

Weston *Instruments*

ALBANY • ATLANTA • BOSTON • BUFFALO • CHICAGO • CINCINNATI • CLEVELAND • DALLAS • DENVER • DETROIT • JACKSONVILLE • KNOXVILLE • LOS ANGELES • MERIDEN
MINNEAPOLIS • NEWARK • NEW ORLEANS • NEW YORK • PHILADELPHIA • PHOENIX • PITTSBURGH • ROCHESTER • SAN FRANCISCO • SEATTLE • ST. LOUIS • SYRACUSE
In Canada, Northern Electric Co., Ltd., Powerlite Devices, Ltd.

4 GOOD REASONS WHY Pedigree Varnishes Lead



1 Ultimate mechanical, thermal and chemical protection.

2 Higher dielectric strength and longer life.

3 Uniform quality assured by laboratory control.

4 Performance proved by years of service under severe operating conditions.

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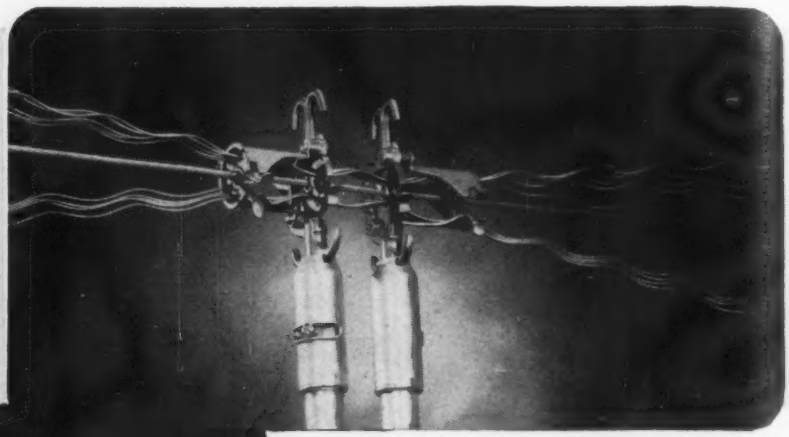
TRI-STATE SUPPLY CORPORATION

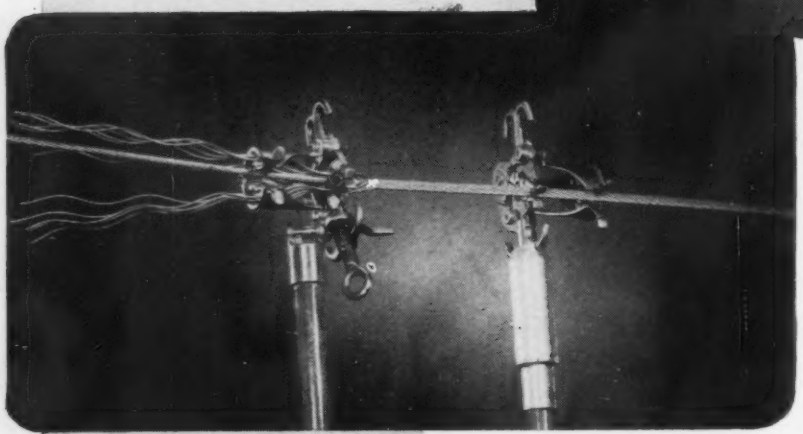
Manufactured by

THE P. D. GEORGE COMPANY, ST. LOUIS, U. S. A.

AMERICAN P.F.T. ARMOR RODS

INSTALLATION OF P.F.T. ARMOR RODS WITH "HOTLINE" TOOLS





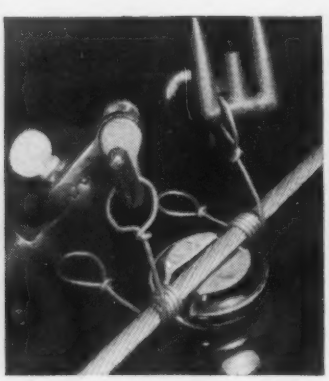
1. Load complete set of reinforcements in twisting dies. Insert eye screws of the tools into sockets of the "hotline" tools, raise to conductor, and close each die by turning screws.

2. Remove socket head from each twisting tool and while holding one tool stationary, rotate the other by means of hooked stick, threading on the armor almost to the end. Hold this die stationary and rotate other die until it leaves reinforcements. Twist first die until it leaves reinforcements. Remove tools from line.

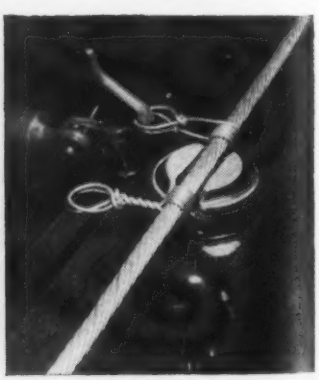
HOW TO APPLY MULTIPLE WIRE TIES WITH "HOTLINE" TOOLS.

1. Make twisting loops and preform tie wires as shown.

2. Hold longest tie wire around back of insulator neck and make 3½ close wraps on one side while holding other end with stick.



3. Make 3½ wraps similarly with other end of same wire. Bring short preformed tie wire around front of insulator neck bending each end around conductor until parallel with ends of first tie wire.



4. Twist the right-hand loops as tightly as possible in a counter-clockwise direction while holding the other ends. Then twist the left-hand ends tightly in a clockwise direction thus completing tie.

AMERICAN STEEL & WIRE COMPANY
USS STEEL
UNITED STATES STEEL

Other U·S·S American Electric Wire and Cable Products

- New PS Conducting Rubber Shielded Wire and Cable.
- Ampyrol — Synthetic-insulated Wire and Cable for switchboards and machine tools.
- Amerclad — Tough abrasion resisting cable for portable tools, motor leads, power cable.
- Amerbestos — Asbestos-insulated Wire and cable.

protect overhead conductors from

MANY devices have been invented to eliminate rural line troubles but few do a complete job. For this reason, constant research has been carried on by American Steel & Wire Company to develop the best combination of conductor, armor rod and tie that will give most reliable service with least maintenance and lowest costs. The most promising combination is U·S·S Amerductor, P.F.T. Preformed Armor Rods and multiple wire ties.

Preformed Armor Rods are round or shaped wires preformed into open helices which fit snugly around the conductor. By proper choice of the number of rods, pitch angle, and the like, a complete covering may be developed over the conductor.

Techniques have been worked out which allow application of special multiple wire ties which are extremely effective, inexpensive and easy to install. Only the usual "hotline" equipment is necessary..

Advantages of Preformed Armor Rods

- **REDUCED VIBRATION EFFECTS AND BETTER DAMPING** protect line from chafing and fatigue. Assure continuing strength to resist sleet and wind storms.
- **LESS CORROSION AT SUPPORTS.** Armor Rods greatly reduce corrosion of conductors at supports and practically eliminate the action of weathering and electrolysis.
- **REDUCED ABRASION AND CHAFING AT SUPPORTS.** There is practically no relative motion between conductor and the ends of the reinforcements. The more vulnerable conductor wires are kept out of contact with clamps or ties.
- **DAMAGE TO CONDUCTOR FROM ARC-OVER ELIMINATED.** Since Armor Rods completely cover conductor, arc-over occurs between Armor Rods and ground and the conductor is protected.
- **PITTING** of conductor strands, presumably due to flashover to suspension clamps, is avoided because of close contact between conductor, Armor Rods and clamps. Strand so damaged in clamps may be reinforced for continued service. "By-passing" clamps with rods will reduce losses in clamps and prevent such conductor burns.
- **HOLDING POWER** of ties and clamps is unbelievably high with P.F.T. Armor Rods.
- **SIMPLE INSTALLATION.** Inexperienced men can learn to install P.F.T. Armor Rods in short time without special tools. Armor Rods can be applied to either "hot" or "cold" lines.

American Steel & Wire Company

Cleveland, Chicago & New York

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
United States Steel Export Company, New York

UNITED STATES STEEL

U·S·S Amerductor Steel-Copper Conductors

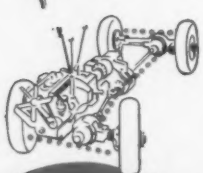
FWDs ARE RUGGED *Dependable* PRIME MOVERS

In everyday duty for utilities, FWDs regularly do 61 jobs. Including special jobs, there are more . . . write for list. For all year 'round utility truck work, you can always depend on FWDs.

FWD trucks . . . rugged, reliable, modern . . . embody the highest development of the original four-wheel-drive principle, pioneered and advanced by FWD since 1910. The true FWD principle with center differential and properly balanced power on all wheels, gives these trucks outstanding mechanical advantages and performance leadership . . . the FWD principle that provides the power and stamina to get through . . . regardless of weather, road conditions or lack of roads . . . with greater assurance and safety. Balanced weight distribution on all four wheels conserves precious tires, replacements, oil and gas. As leaders in performance, economy and style, FWDs are a great "buy" for utilities. Their value is so widely recognized that they are used by over 200 utilities, many of which operate large FWD fleets.

THE FOUR WHEEL DRIVE AUTO COMPANY, Clintonville, Wisconsin

Canadian Factory: Kitchener, Ontario



FWD TRUCKS

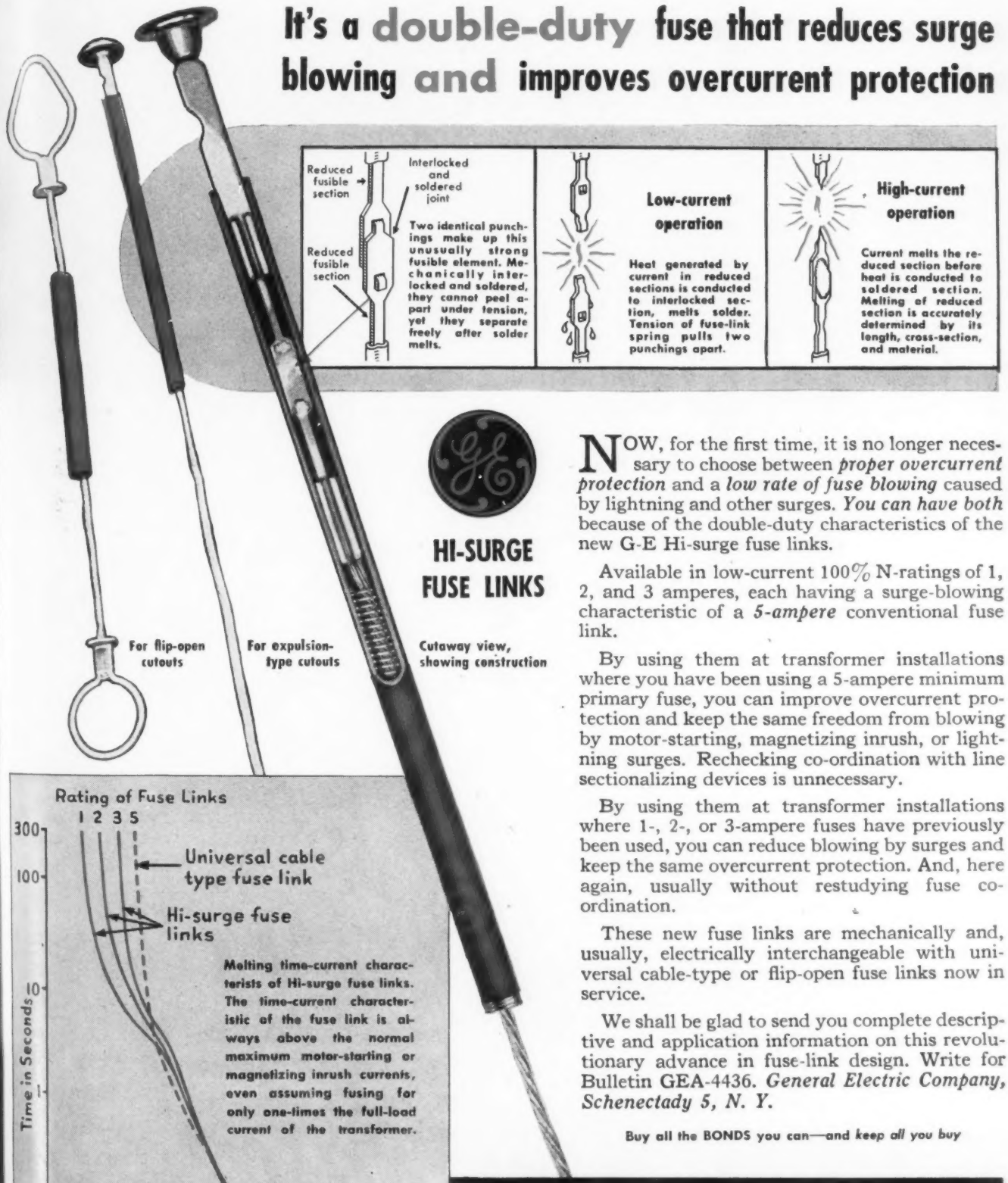
THE ORIGINAL EXCLUSIVE BUILDERS OF FOUR-WHEEL-DRIVE TRUCKS

More than $75,000,000 in purchases of FWD Model SU alone in the comparatively short span of forty-eight months, emphasizes FWD leadership in this field!

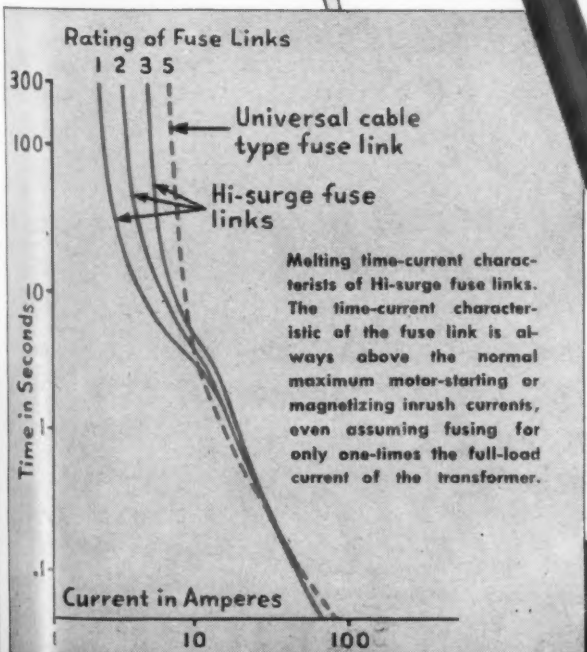
FWD Distributors: ARIZONA—Arizona-Cedar Rapids Co., 401 N. First St., Phoenix; CALIFORNIA—The Four Wheel Drive Auto Co., 1339 Santa Fe Ave., Los Angeles 21, and FWD Pacific Co., 469 Bryant St., San Francisco 7; COLORADO—Liberty Trucks & Parts Co., P. O. Box 1889, Denver 1; IDAHO—Intermountain Equipment Company, Broadway at Myrtle St., Boise; MONTANA—Steffeck Equipment Co., 11 E. Cutler St., Helena; NEVADA—Allied Equipment Co., Reno; NEW MEXICO—The Myers Company, Las Cruces; OKLAHOMA—Halliburton Oil Well Cementing Co., P. O. Drawer 471, Duncan; OREGON—Feenaughty Machinery Co., 112 S. E. Belmont St., Portland 14; UTAH—Cate Equipment Co., 49 E. 9th So., Salt Lake City; WASHINGTON—Feenaughty Machinery Co., 1028 6th Ave., So. Seattle 2, Glenn Carrington & Co., 91 Columbia St., Seattle, and Feenaughty Machinery Co., 715 N. Division St., Spokane; WYOMING—Wortham Machinery Co., 517 W. 17th St., Cheyenne; ALASKA—Glenn Carrington & Co., Nome, Fairbanks, Anchorage.

HERE'S A NEW FUSE LINK THAT'S REALLY DIFFERENT

It's a double-duty fuse that reduces surge blowing and improves overcurrent protection


Reduced fusible section
Interlocked and soldered joint
Reduced fusible section
Two identical punchings make up this unusually strong fusible element. Mechanically interlocked and soldered, they cannot peel apart under tension, yet they separate freely after solder melts.
Low-current operation
Heat generated by current in reduced sections is conducted to interlocked section, melts solder. Tension of fuse-link spring pulls two punchings apart.
High-current operation
Current melts the reduced section before heat is conducted to soldered section. Melting of reduced section is accurately determined by its length, cross-section, and material.
For flip-open cutouts
For expulsion-type cutouts
Cutaway view, showing construction

HI-SURGE FUSE LINKS



Melting time-current characteristics of Hi-surge fuse links. The time-current characteristic of the fuse link is always above the normal maximum motor-starting or magnetizing inrush currents, even assuming fusing for only one-times the full-load current of the transformer.

NOW, for the first time, it is no longer necessary to choose between *proper overcurrent protection* and a *low rate of fuse blowing* caused by lightning and other surges. *You can have both* because of the double-duty characteristics of the new G-E Hi-surge fuse links.

Available in low-current 100% N-ratings of 1, 2, and 3 amperes, each having a surge-blowing characteristic of a *5-ampere* conventional fuse link.

By using them at transformer installations where you have been using a 5-ampere minimum primary fuse, you can improve overcurrent protection and keep the same freedom from blowing by motor-starting, magnetizing inrush, or lightning surges. Rechecking co-ordination with line sectionalizing devices is unnecessary.

By using them at transformer installations where 1-, 2-, or 3-ampere fuses have previously been used, you can reduce blowing by surges and keep the same overcurrent protection. And, here again, usually without restudying fuse co-ordination.

These new fuse links are mechanically and, usually, electrically interchangeable with universal cable-type or flip-open fuse links now in service.

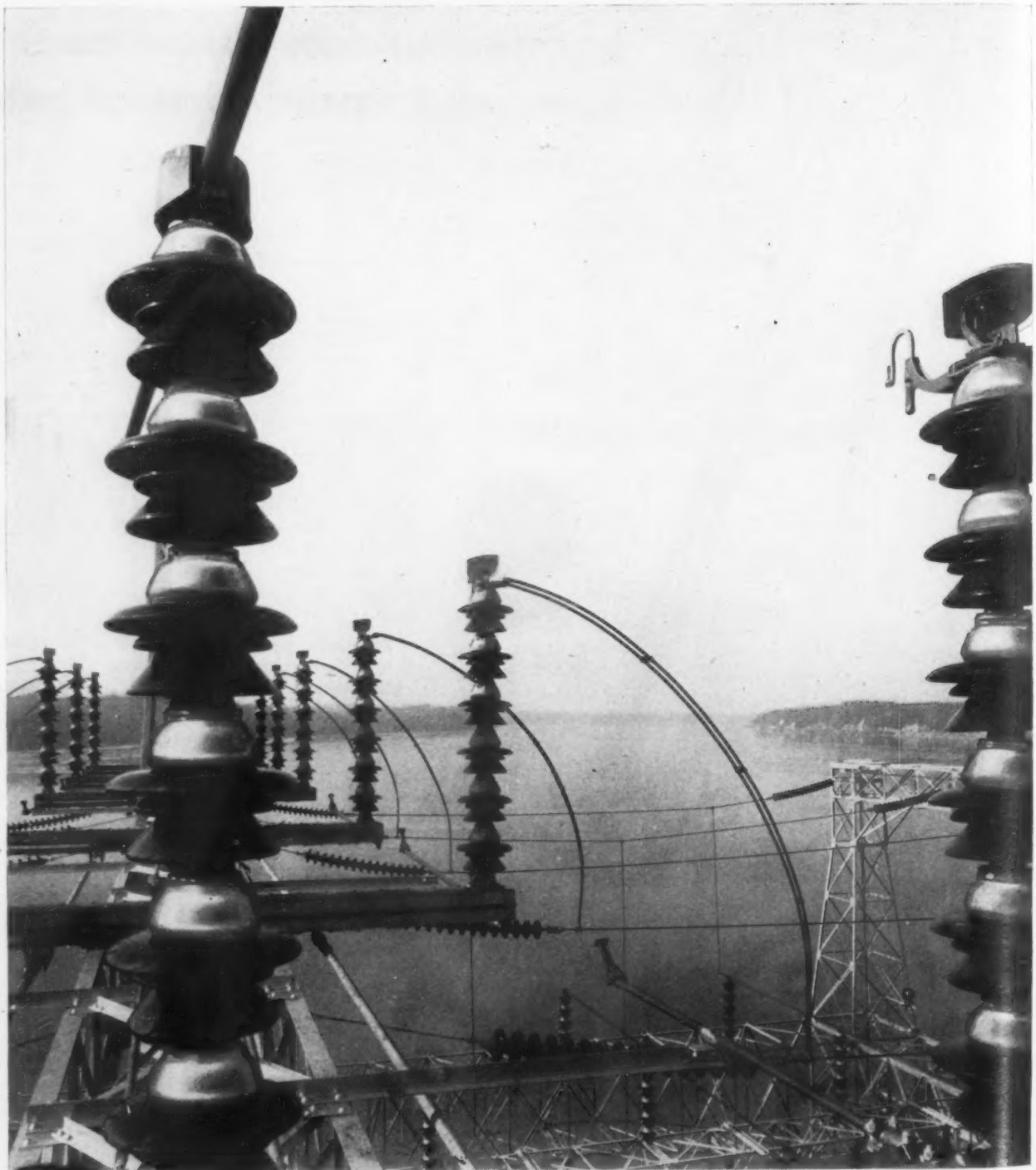
We shall be glad to send you complete descriptive and application information on this revolutionary advance in fuse-link design. Write for Bulletin GEA-4436. *General Electric Company, Schenectady 5, N. Y.*

Buy all the BONDS you can—and keep all you buy

GENERAL ELECTRIC

405-16-5254

BUILT IN STABILITY*



*"The strength to stand or endure without material change". . . Webster

LOCKE *Insulator*

is attested to by service records on

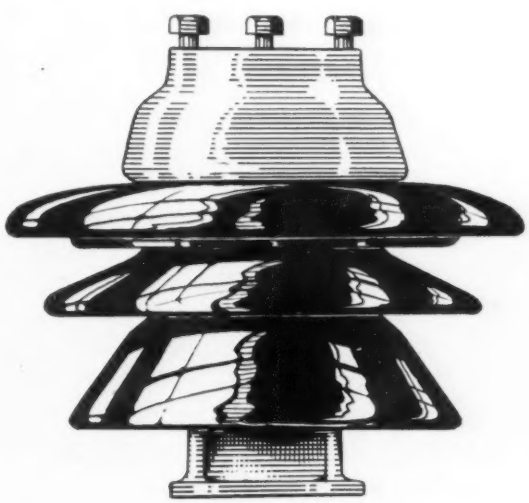
Locke Switch-Type Insulators

Stability—"strength to stand or endure without material change"—results from a combination of porcelain and design.

When you visit the Locke plant at Baltimore you will find two separate and distinct laboratories a half mile apart. One is the high voltage electrical and mechanical research and design laboratory and the other is the ceramic research laboratory. They are definitely kept apart so that each staff can concentrate solely on its own problems, uninfluenced by the other.

The finest design applied to ordinary porcelain will result only in unsatisfactory service life as will a poorly designed insulator made even with the finest Locke porcelain.

Locke Switch Type insulators are not a compromise but rather the combination of accurate, proved design and a perfected body.

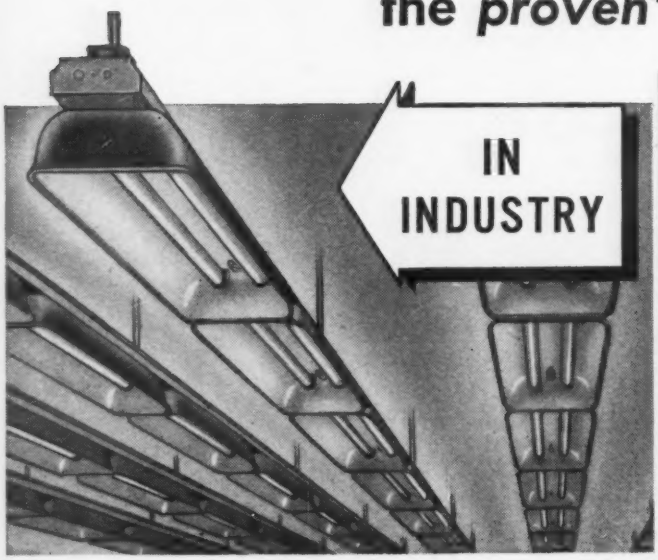


For maximum satisfactory life always specify Locke Switch Type Insulators —the insulators with an unequalled performance record.

Corporation BALTIMORE MARYLAND

Relight with Confidence

the *proven** Miller way



Miller *Continuous Wireway* FLUORESCENT LIGHTING SYSTEMS

offer 6 important advantages

1. Best *seeing* light at lower cost
2. Modern appearance
3. 30 to 50% lower cost of installation
4. Reductions up to 80% in wiring material
5. Simplified maintenance
6. Special construction features

* The Miller Company has pioneered better lighting for 101 years.

Miller *Continuous Wireway* FLUORESCENT *TROFFER* LIGHTING SYSTEMS

offer the "basic 6" plus:

7. *New* Architectural aids
8. *New* possibilities in esthetic design
9. *New* architectural and structural versatility
10. *New* installation simplicity

Miller *50 and 100 foot candler* fluorescent lighting systems are known the world over. They were an important factor in winning our war of production.

Miller Fluorescent Troffer Lighting Systems (for stores, offices, schools and public buildings) have *already* opened new vistas in architectural design. They have *already* solved old structural problems—without creating *new* problems.

The Miller way to better lighting is the *known* way—the *proven* way—the way of no regrets.

Miller field engineers are conveniently located to serve you.

THE MILLER COMPANY • MERIDEN, CONNECTICUT

MILLER
SINCE 1844

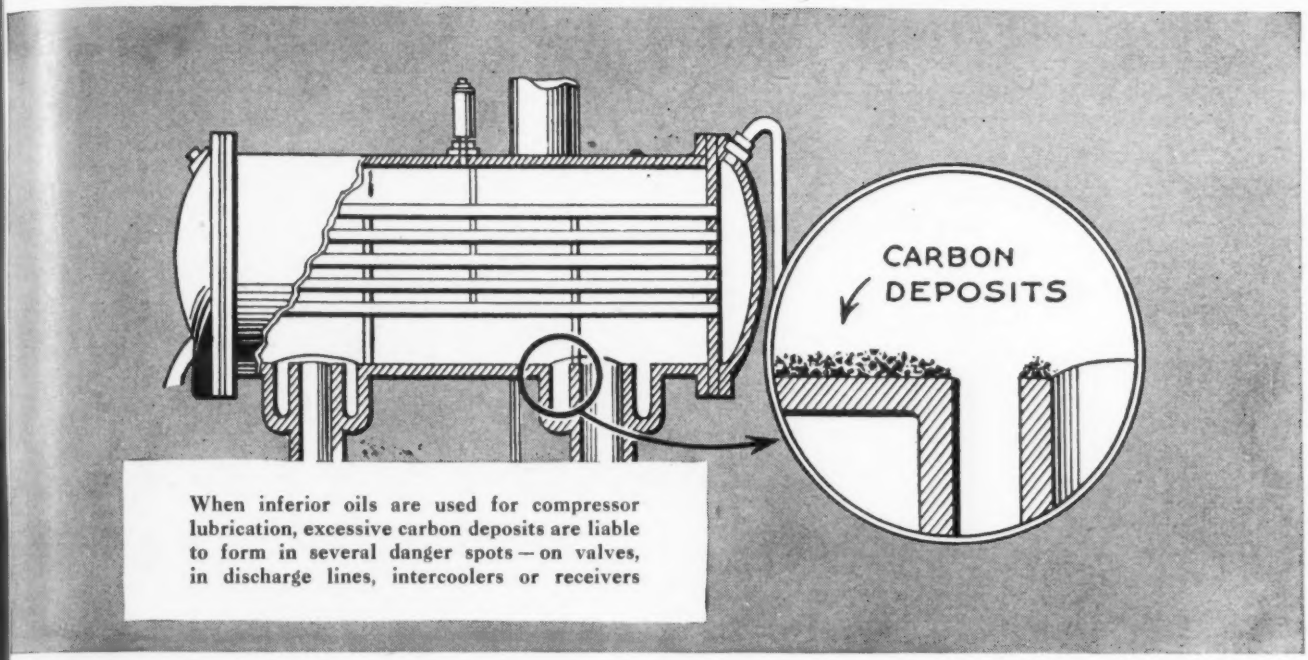
ILLUMINATING DIVISION
Fluorescent, Incandescent
Mercury Lighting Equipment

OIL GOODS DIVISION
Domestic Oil Burners
and Liquid Fuel Devices

ROLLING MILL DIVISION
Phosphor Bronze and Brass
in Sheets, Strips and Rolls

WAR CONTRACTS DIVISION
War Materiel

FOUNDRY DIVISION
Non-Ferrous Metal Castings



When inferior oils are used for compressor lubrication, excessive carbon deposits are liable to form in several danger spots — on valves, in discharge lines, intercoolers or receivers

In Compressors

CARBON SPELLS DANGER

CARBON IS BAD NEWS in compressors. It interferes with valve action . . . clogs discharge lines . . . "insulates" cooler pipes, preventing proper dissipation of heat. As carbon deposits accumulate, danger threatens — because ultimately the carbon becomes hot enough, from "backed up" compressed air, to ignite oil vapors. At that point, if the oil is sufficiently volatile, you can expect one of two things—fire or explosion.

You can avoid that danger by using oils engineered expressly for compressor lubrication—Shell Compressa Oils.

Refined by a special solvent extraction process, Compressa Oils are highly oxidation stable . . . free from carbon and "gum" forming materials. These job-engineered oils also have the high and narrow boiling ranges to resist vaporizing . . . the adhesiveness to prevent "scouring" by discharged air.

Shell Compressa Oils come in several grades that meet compressor lubrication needs varying from low temperature ice machines to extremely high pressure multi-stage compressors operating under wet or dry conditions. Shell Oil Company, *Incorporated.*

SHELL COMPRESSA OILS

Shellengineered for the job

YOU GET ALL 5 WITH "UNITIZED"

★ Quicker ordering, manufacturing, shipment
★ Improved service continuity
★ Complete operating safety
★ Easy accessibility
★ Advanced manufacturing and design features

inspection time is *Shorter*
maintenance cost is *Lower*

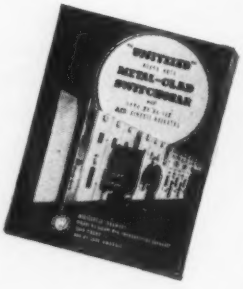
Westinghouse "Unitized" Switchgear is fully partitioned, but is designed for quick and easy accessibility.

Easily removable front and rear barriers give quick access to main bus compartments, to current transformers and connections. Inspection is reduced to a matter of minutes. For inspecting operation of main breaker contacts, the breaker is withdrawn, the interphase barrier and arc chutes removed. Contacts are then in plain sight at working height.

This quick and easy accessibility saves time, reduces costs of routine inspection and maintenance for all Westinghouse "Unitized" Switchgear. J-60591

SEND FOR THIS BULLETIN

Accessibility is only one advantage of "Unitized" Switchgear. B-3036 tells the full story on switchgear with heavy-duty air breakers. Write for it to Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.



1. With rear barriers removed, the current transformers and primary connections are readily accessible.
2. Breaker pulls straight out for inspection.
3. Interphase barrier is easily removed by loosening holding bolts and sliding it forward. This exposes all arc chutes.
4. Arc chutes are readily removed by taking out a few accessible bolts.
5. Breaker contacts are easily accessible at a convenient working height.

Westinghouse
PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

"UNITIZED" SWITCHGEAR

WESTINGHOUSE "UNITIZED" SWITCHGEAR IS AVAILABLE WITH AIR OR OIL BREAKERS TO MEET EVERY REQUIREMENT

What A Rough Four Years

...And before we could take a deep breath, we were given another challenge—adapting *without delay* new developments, new techniques to civilian uses.

We like to think of our wires and cables as we think of the veterans now returning to civilian life. These veterans will not be the same people we sent off to war. They are battle-tested—they have grown up—they are ready to take on greater responsibilities than before.

Our wires and cables, too, are ready to take on new responsibilities. They have had to do jobs tougher than any wire ever faced . . . wherever the war took them—and it took them everywhere . . . moist, steaming jungle to bleak, frozen wastes. Whatever the conditions and demands—they came through the better for them.

What does this mean to the Electrical Wholesaler and Electrical Contractor? Just this—a new and complete line of merchandise made up of such products as Building Wire with rubber, synthetic and plastic insulations (including Laytex*—smaller in diameter and lighter in weight), Lead Cables, Royal Line of Rubber Jacketed Portable Cords and Cables, Non-Metallic Cables, Flexible Cords, and many others . . . all more highly developed, more efficient than ever before.

Yes, it was a tough four years . . . we learned a lot . . . and now our new knowledge belongs to you.

*Reg. U. S. Pat. Off.

U. S. ELECTRICAL WIRES AND CABLES

Serving Through Science

UNITED STATES RUBBER COMPANY

1230 SIXTH AVENUE • ROCKEFELLER CENTER • NEW YORK 20, N. Y.

7 Special Points of Superiority

Dual Grip Assures Positive Electrical Contact
Tab Guides Lamp Insertion
Channel Guides for Inserting Lamp Pins
Sturdy Spring Assures Snap Action
Tapped Hole Simplifies Mounting
No Nut Required
Tapered Back Allows Space For End to End Mounting
Patented
Other Pats. Pend.
High Dielectric Strength

Lloyd

FLEX-LOC

Lamp Holder

FLEXIBLE—Automatic—self adjusting to variations in lengths of lamps and spacing dimensions in fixtures.

AUTOMATIC LOCK AND CONTACT is positive. Stands all shocks. Lamp cannot fall out.

INSERTING LAMP: Place lamp pins on both sides of lamp holder guiding tab. Push lamp up slightly and pins will slide into channels. As pins slide up to terminal holes, the holder is flexed outward, compressing the spring. As lamp pins enter holes, the holder snaps inward, with spring returning to normal.

TO REMOVE LAMP: Take hold of lamp with one hand. With other, press guiding tab of nearest lamp holder outward and the lamp will disengage itself.

LLOYD AUTOMATIC STARTER

IN THE NEW RED PLASTIC CAN

Stronger—Higher Dielectric Strength

When lamp becomes inefficient . . . flickers or blinks, Lloyd Automatic cuts off the current automatically . . . starts the new lamp when inserted, automatically.

Prevents overheating of ballast. Saves maintenance and power costs.

Listed and Approved by Underwriters' Laboratory Inc.

Certified by Electrical Testing Lab. Spec. 6.

Pat. Nos. 2200443 2228210

LLOYD PRODUCTS CO.

LLOYD POLICY INSURES QUALITY

Providence 5, Rhode Island

Representatives — Branch Offices — Warehouse Stocks in 23 Leading Cities

PRODUCTS

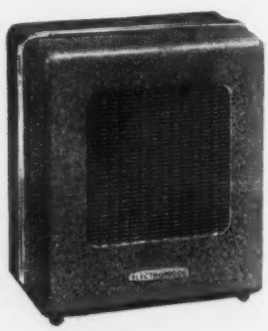
that are news

Bagless Cleaner (1000)

Timm Aircraft Corp. is manufacturing a bagless vacuum cleaner, with an automatic self cleaning feature. The aluminum alloy case is built on a streamlined design, with an outlet vent which has a shuttered deflector to prevent disturbing dust on the floor. When cleaning is finished, an automatic device shakes the dirt into a removable drawer. A retractable cord reel keeps the electric wire coiled inside the cleaner when not in use. Adjustable power control is said to permit reduction for delicate fabrics or light-weight materials. Attachments are provided and, according to the manufacturer, by removing the deflector plate, the motor may be put to various uses where warm, filtered air is required.

Room Heater (1001)

Electromode Corp. has added a portable room heater to its line. This heater is claimed to have unusual safety features and to be economical to operate. A patented element is the same as used on the manufacturer's heaters for Navy applications, it is stated. Resister wire is enclosed in a tubular sheath which, in turn, is sealed in a one-piece finned aluminum casting. The heating element is said to have a



relatively low operating temperature, due to high thermal conductivity plus a large convection surface which radiates heat rapidly. These heaters can be used on regular 110-120-volt a-c systems. Capacity rating is 1,320 watts. The switch is double throw so that the heater-fan combination or the fan only may be used.

Glow Switch Plate (1002)

Associated Projects Co. is offering a wall switch plate containing a glow lamp, which operates when the lights it controls are shut off; is extinguished automatically when the lights are switched on. Called the Lumi Nite, it is made of molded Plaskon and is claimed to use less than two cents worth of electric current per year. Bulb life is said to be high, measuring in thousands of hours.

Roasters (1003)

Westinghouse announces that its first electric roasters since 1942 are off the production line. They are of 18-qt. capacity and have polished aluminum covers with a glass panel, an oven dish for meat and two oven dishes for vegetables. They are decorated with a blue trim.

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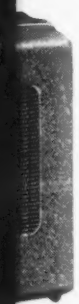


A Statement of Kelvinator's Retail-Minded Program as Selling Starts Again

WITH production of Kelvinator refrigerators and electric ranges increasing daily, and the familiar sound of selling soon to be heard once more in retailers' showrooms—we again make a statement of the thinking, the policies and the program that will back these new products and mark the beginning of a greater business future for retailers holding the Kelvinator franchise . . . the most valuable franchise in the appliance industry.

It will soon be six years since Kelvinator electrified the industry by announcing its "Retail-minded" Dealer Program . . . with its "selective dealer" provisions . . . fewer but finer models . . . sharply lowered prices . . . backed up by policies in which the *retailers' interests took precedence over every other consideration.*

That program made history. It launched a sales advance which carried Kelvinator dealers to new positions of leadership. Average sales of Kelvinator retailers doubled . . . quadrupled . . . and by the end of 1941, had reached eight times the average dealer volume of 1939.

The same kind of retail-minded thinking which shaped Kelvinator's pre-war program is the sound basis of dynamic future plans.

Here are the policies that Kelvinator retailers can count on—policies conceived with their interests as retailers in mind—developed specifically to help them build a sounder business future.

RETAIL-MINDED DISTRIBUTION—A selective dealer organization of not the most but of the *finest* retailers . . . with an adequate market for every dealer, making possible *more sales per dealer.*

COMPETITIVE PRICES—Kelvinator's aim will always be to maintain a price policy that is vigorously competitive, prices that will mean *more sales per dealer.*

PRODUCT LEADERSHIP—Kelvinator will adhere to the manufacturing principle of "quality first." Add to this Kelvinator's determination to have its products contain brilliant features with strong consumer appeal and practical usefulness in the home. And the results can only mean *more sales per dealer.*

RETAIL-MINDED MERCHANDISING—Kelvinator advertising, sales promotion and sales training will always be designed with but one purpose—to move merchandise off the retailer's floor, to make *more sales per dealer.*

PRODUCT STRATEGY—Kelvinator will continue its policy of limiting the number of models to the type and size most needed and most in demand . . . thereby holding dealers' investments in inventories at a minimum. To give retailers more "top-of-the-line" sales, Kelvinator products will be designed to make the value of step-up features between models instantly visible to customers. Close adherence to these policies means *more profit per sale.*

These are retail-minded policies of Kelvinator. Behind them stand a group of men, both factory and field, who are *one* in the conviction that Kelvinator's success and future progress is dependent on the Kelvinator retailer's success. With all thinking and planning keyed to that conception, it is to be expected that Kelvinator will quickly sense trends affecting the retailers' interests . . . and that in the future, as in the past, Kelvinator will lead in products, policies and program, in which *more sales per dealer* is the one objective.

C. Lee Lawson

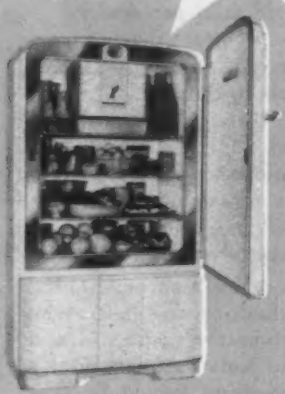
Vice President in Charge of Sales

Get the Best things First

Get **Kelvinator**

4 Great New

Start with CS-7



★ New Kelvinator beauty, famous Kelvinator dependable performance and extra value, combined in a great new refrigerator that includes all of Kelvinator's basic engineering and construction features. 7 cu. ft. capacity . . . 12.2 sq. ft. of easy-to-reach shelf area . . . 9 lbs. of ice cubes.

. . . Step up to C-7

★ Step up one model . . . add four great features the prospect can see and will want—large, sliding Kelvin Crisper . . . capacious, sliding Meat Chest . . . 1¼ bu. Vegetable Bin . . . 5-way magic shelf . . . plus every sales-making Kelvinator feature incorporated in the CS 7.

. . . Step up to CD-7

★ Step up one more model . . . and show your prospect five extra sales features loaded with consumer appeal . . . everything that's in the C-7, plus a second large, sliding Kelvin Crisper with crystal-clear glass cover . . . 13.1 sq. ft. of shelf space . . . and 13 lbs. of ice cubes.

With these four great new Kelvinators, dealers can meet the needs of every prospect in today's great refrigerator market. In beauty ... in consumer appeal ... in extra value . . . these four refrigerators set new standards of leadership. Add to this Kelvinator's dependable Polarsphere sealed power unit, with its unmatched record of trouble-free performance, and long-range customer satisfaction is assured. This, in turn, assures the Kelvinator dealer's future in the appliance business. And that's why we say—

Get the Best things First

Kelvinators

GREATER in Beauty!

GREATER in Consumer Appeal!

GREATER in Dependable Performance!

GREATER in Extra Value!

hen Step up to the Kelvinator MM-9

IT'S A FROZEN FOOD CHEST!

IT'S THE MOIST-MASTER REFRIGERATOR

IT'S BOTH COMBINED IN ONE!

★ It's a Frozen Food Chest . . . it's a Moist-Master refrigerator . . . it's both combined in one beautiful cabinet. Total capacity 9 cu. ft. . . . with the zones of cold ideal for every kind of food—freezing cold . . . dry cold . . . moderately-moist cold . . . super-moist cold. Room for 36 twelve ounce packages of frozen food plus 13 lbs. of ice cubes.

Get **Kelvinator**

Plus 3 Great Electric Ranges

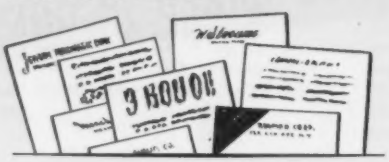
THE KELVINATOR "AUTOMATIC COOK"

. . . the top model of the Kelvinator electric range line. It features . . . the Kelvinator "Automatic Cook" control, the "brains" of the range that starts, times and stops all cooking operations . . . the Scotch Kettle that will cook a whole meal for less than 2¢ . . . multiple speed switches . . . 2-unit broiler oven . . . warming oven . . . and two utility drawers. This sensational leader, plus the two other great Kelvinator electric ranges, give the Kelvinator retailer a complete line to meet every prospect's needs.

And a powerful merchandising program to build the Kelvinator Retailer into a dominant position in the electric range business

LOCAL PROMOTION

Radio spot announcements, newspaper advertising, and a continuous flow of promotional material will be made available, from which specific campaigns can be tailor-made to fit the Kelvinator retailer's local market.



RADIO

A new time, 10:30 P. M. Wednesdays . . . on one of the great national networks, the Columbia Broadcasting System . . . increases the effectiveness of Kelvinator's high-rating radio program. For some months now, hard-hitting radio commercials have featured the Kelvinator electric ranges and refrigerators on every program. They will continue to build public acceptance for Kelvinator electric ranges and help make the Kelvinator retailer a dominant factor in the electric range business.

NATIONAL MAGAZINES

The October 8th issue of Life Magazine carries this four-color, full-page advertisement announcing the new line of Kelvinator electric ranges to its millions of readers. This is the first of a series that will dramatically sell the superior features of Kelvinator electric ranges to Kelvinator retailers' prospects throughout America.

Get the Best things First

Get **Kelvinator**

PIN UP FEATURES THAT RING UP SALES OF Samson HEATING PADS
COVER 100% WETPROOF
Permanent Cover of "Fairprene," DuPont's durable, waterproof coated fabric. Edges and cord inlet sealed by vulcanizing. Safe for wet applications.
4 SAFETY CONTROLS
Each of 3 Fixed Heats controlled by 4 precision thermostats—giving extra safety from overheating, keeping constant the temperature selected.
Genuine WETPROOF
55 WATTS 115 VOLTS
USE NO PINS
SAMSON ELECTRIC HEATING PAD
FOLLOW INSTRUCTIONS ON BOX
MADE IN U.S.A.
3 FIXED HEATS
Safe-T
Current automatically regulated to keep heat at temperature selected.
Low 125°
Medium 150°
High 175°
CUSHION COMFORT
New soft padding and improved cushion construction give restful comfort on pillowed heat.
EXTRA COVERS
Smartly tailored slip-ons of quality fabrics in attractive colors and patterns. "Zelan" water-repellent finish to resist stains.
"TOUCH TELLS" SWITCH
Even in the dark, a finger-touch tells if the switch setting is the one you want—Low, Medium, or High. Cord connections withstand tugs.
"ZELAN" TREATED COVER FABRICS
Cover fabrics treated with DuPont "Zelan," the water repellent finish that doesn't wash out. Resists stains. Will launder or dry-clean.
8 FOOT CORD
Gives a liberal freedom in moving the heating pad to different body contacts, and allows for the extra long reach to baseboard outlets.

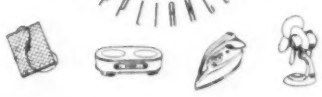
No other heating pad offers so many sales-making features as Samson . . . and, of course, *only* Samson has the patented, time-tested Safe-T Selective Heat Circuit that assures customer satisfaction and safety.

We Are Participating In NATIONAL HEALTH AID WEEK October 5-15, 1945

Samson Heating Pads are already in volume production . . . as are Samson Selective Speed Automatic Irons. Soon to come will be Samson Safe-flex Rubber Bladed Fans and Samson Variable Control Table Ranges. Watch for them . . . and for news of other profit-making Samson appliances.

BUY BONDS

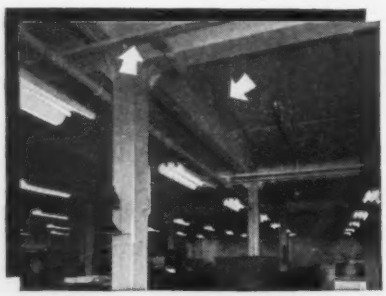
ELECTRICAL SAMSON APPLIANCES

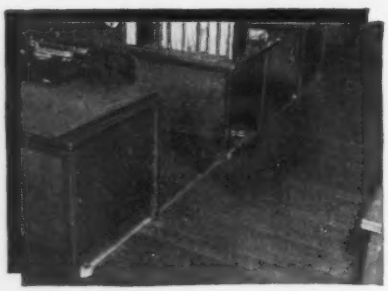


SAMSON UNITED CORPORATION, ROCHESTER 10, N. Y. ✦ Samson United of Canada Limited, Toronto

ANNOUNCING WIREMOLD
BUSINESS-BUILDERS
"HOW TO USE IT" Competition
• REALLY WORTHWHILE PRIZES •

TYPICAL EXAMPLES OF WIREMOLD INSTALLATIONS THAT COULD • WIN FOR YOU •





• 1ST. PRIZE . . . $500.00
• 2ND. PRIZE . . . $250.00
• 3RD. PRIZE . . . $100.00

$25 PAID FOR ALL ENTRIES USED IN WIREMOLD PROMOTION

OPEN TO ALL CONTRACTORS AND ELECTRICAL MAINTENANCE MEN

Today... and in the near future... you are planning many jobs using Wiremold Raceways and Fittings in war plants, hospitals, schools, stores, offices and other types of buildings. All of these jobs are interesting to us and many of them will point the way to future Business-Building opportunities for you and your fellow electrical men. That is why we are announcing this Wiremold "How to Use it" competition... to record the best of these Wiremold applications for the benefit of all. Send now for folder giving full details of how to enter, and the few simple rules.

Awards will be made for those installations judged as showing business-building possibilities in a wide field, as well as good judgment in the selection and use of our products, bearing in mind the wide adaptability and interconnectability of Wiremold in completing the wiring system "FROM PANEL BOXES TO OUTLETS".

The judges shall be chosen from the electrical industry, and their decisions shall be final.

COMPETITION OPENS OCT. 1, 1945
...CLOSES APRIL 1, 1946

THE WIREMOLD COMPANY, HARTFORD 10, CONN.

Automatic Ironer (1004)

Bendix announces that its new automatic home ironer is past the experimental stage and in production. This machine features an under-the-roll shoe design with three usable open "ends," two on the shoe and one on the roll. The shoe can be opened to a clearance of four inches. Adjustments are provided for both leg clearance and knee controls. Included are dual thermostat controls, dual speeds, illuminated control indicators, a Bakelite work table, double adjustable utility shelves and an adjustable lapboard.

Table Model Ironer (1005)

Horton Mfg. Co. has announced a table model ironer, for which it claims such features as sustained heat flow; a three-way control for knee, elbow or finger tip operation; automatic heat control for different types of fabric; a lever to release the shoe from the ironing if power is turned off. Both ends of the roll are open.

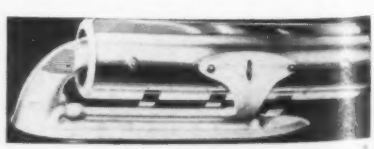
Combination Washer (1006)

The Thor Automagic, a combination clothes and dish washer, has separate and interchangeable sets of tubs and accessories that operate inside a streamlined enameled steel cabinet. Clothes washer is agitator-spinner type. Dishwasher parts are of stainless steel and aluminum and include a spinner bowl, a set of hollow steel fingers or tubes mounted on agitator drive shaft over which wire baskets are placed for silverware, dishes, cups; drain water is pumped out of base of machine uphill into a sink or into permanent plumbing drains.

Bathroom Heater (1007)

Thermador has announced a postwar model built-in, "head-to-heels" bathroom heater similar to its prewar model. This heater requires no vent or flue, is 9 in. wide, with grille and reflector of chromium plated steel. Wall box is steel, back enameled. These heaters are provided with a switch on the grille, a double pole on the 230-volt and a single pole on the 115-volt units. Grille size is 9x48x¼ in. Shipping weight is 14 lb.

Portable Ironer (1008)



Empire Ironer Inc. has a portable ironer for use on any table. It weighs 23 lb.; starts and stops by a touch of elbow on lever. The motor and gears are built inside the roll, which is 21 in. long.

NEW G-E RANGES ARE NOW IN PRODUCTION!

Sparkling! Streamlined!

OFFERING MARVELOUS, SALES-MAKING FEATURES THAT NO OTHER RANGE HAS!

General Electric Ranges are back again!

A few months ago, Uncle Sam said, "Keep on turning out war materials—but in addition, make G-E Ranges for the home front."

And these new ranges are *really something!* Shining-white beauties that feature G-E "Speed Cooking" . . . plus eye-opening G-E "exclusives" that'll sell on sight!

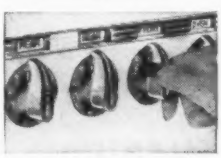
You'll be receiving your first G-E Range very soon. In the meantime, we're telling women all about them with coast-to-coast advertising in magazines and on the air. Highlighting features like . . .

✓ Famous Calrod Units!

Makes G-E "Speed Cooking" possible. Also assures controlled temperatures, with 5 cooking speeds. A cinch to clean, too!

And how's this for a service record? Out of millions of Calrod Units placed in service since 1932, less than ½ of 1% have been returned to us for service or replacement!

✓ Tel-a-Cook Lights in Color!



A wonderful cooking help, and exclusively G-E! Each cooking speed is indicated by a different-lighted color on control panel. Tells instantly "what's cooking," and at what speed!

✓ No-Stain Oven Vent!

The G.E. no-stain vent is different—helps keep the kitchen clean. A "clean sales point" for busy housewives!

✓ Exclusive Tripl-Oven!

Here's a G-E feature that'll go straight to a woman's heart! A Master Oven, 20% larger than most, includes a Super Broiler with radiant, charcoal-type broiling, and a smaller Speed Oven that heats to 400 degrees in 5½ minutes (faster than any other range oven).

Here's the beautiful, deluxe-equipped G-E Stratoliner . . . tops in modern electric cooking. Also available—the G-E Airliner and G-E Leader, remarkable for their good looks and performance, with a world of built-in quality that will impress every housewife.

"THE APPLIANCES MOST WANTED BY MOST WOMEN"

AUTOMATIC ELECTRIC **RANGES**

GENERAL ELECTRIC

G-E Features Step Up Each Range Sale!

Extra, exclusive features not only help you sell—but help you make *more dollars per sale!*

That was true before the war. It'll be true again. For although G-E Ranges are priced on the nose with competition, carefully selected features in each price class enable G.E. to offer the highest average unit range sale in the industry!

G-E Quality Has A Big Waiting Market!

All over the country, women know the G-E name—and what it means in quality. Recent surveys show—

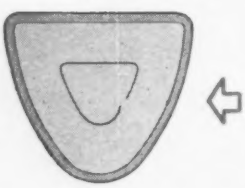
2½ times more women prefer the General Electric Range than any other electric range.

So get set now to cash in on the biggest appliance market in history. Feature G-E Ranges—with the features women have waited for! General Electric Co., Appliance and Merchandise Dept., Bridgeport, Conn.

CHROMY Says:

"It's Easier to Sell

EXCLUSIVE CHROMALOX DESIGN PROVIDES EVER-LEVEL COOKING SURFACE

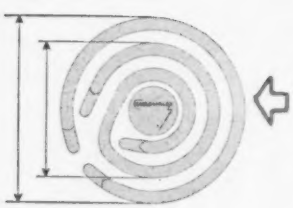


PATENTED TRIANGULAR CROSS-SECTION

The top surface is flatter and wider. Tubes have greater structural strength. Entire contact surface remains uniformly level under all conditions.

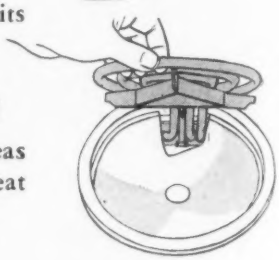
EXCLUSIVE CHROMALOX SURFACE PATTERN

Arrangement of coiled tubes provides uniform heat over entire surface—three-point anchorage permits free-lateral expansion without distortion.



ADAPTABLE TO ANY SIZE POT OR PAN

Each unit has two separately controlled cooking areas for greater flexibility and economy. Concentrated heat in center coil is ideal for coffee percolator.



ALL PARTS EASILY CLEANED

Cooking Unit lifts up and can be cleaned all over in a jiffy. Reflector Pan slides out and is as washable as a china dish.

CHROMALOX TRIANGULARS ARE MADE WITH "INCONEL"— THE FINEST HEAT-RESISTING ALLOY AVAILABLE

Fast! Easy to Clean! Long Life! Economical!

"... the Best!"

CHROMALOX TRIANGULAR Electric RANGE UNITS

FOR ANY MAKE OR SIZE ELECTRIC RANGE

Easier to Service!

Any part . . . either of the two coils . . . or the entire unit can be replaced in a few minutes. A screw driver is all you need.

Fit All Ranges!

Only two service sizes to stock. CHROMALOX Adaptor Rings insure a perfect fit in any range opening. Quicker servicing, smaller inventory and greater customer satisfaction mean more profit to you.

Write to Edwin L. Wiegand Co. for details on the new CHROMALOX Triangular Unit and Catalog CF-145 for information on the complete line of CHROMALOX Electric Range Units and Adaptor Rings.

MANUFACTURED BY EDWIN L. WIEGAND COMPANY

7540 Thomas Boulevard · CHurchill 3200 · Pittsburgh 8, Pennsylvania

Representatives in Principal Cities—We Will Connect You

ON NEW RANGES AND FOR REPLACEMENT

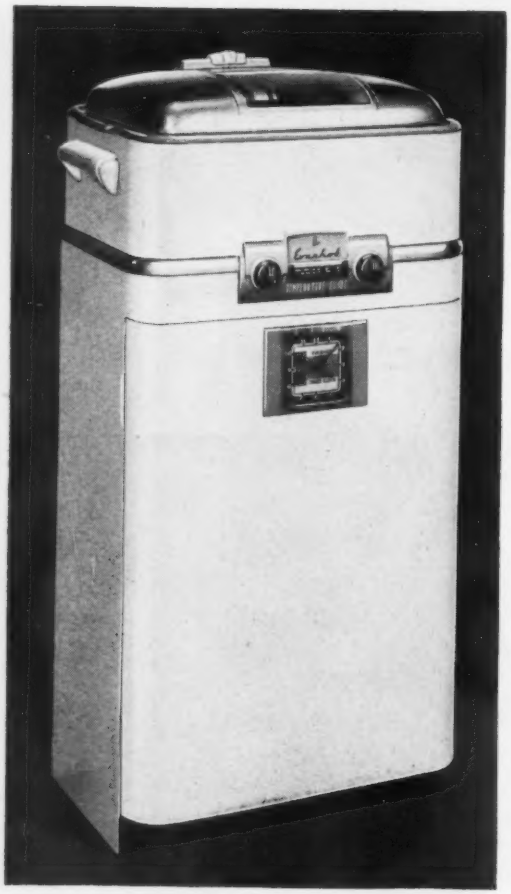
CHROMALOX

***means* ELECTRIC COOKING AT ITS BEST!**

RC-9

Presenting ★ ★ ★

OUR NEW MODEL 900 Electric Roaster



● The advanced Everhot Electric Roaster, embodying unique, startling features of design, construction and performance combined with traditional Everhot quality and dependability is now ready for distribution . . . Completely engineered — thoroughly tested this new Everhot fully meets the expectation of dealer and consumer for extraordinary post-war advancement in such utilities.

Features That Make Sales

Advanced styling brings new beauty and symmetry to cabinet and roaster ensemble presenting sheer, easily cleaned surfaces, artistic trimmings, toe-in plate, and rigid reinforced door with concealed handle.

- Observation glass in lid.
- Combination in-built revolving temperature guide and cooking time-chart.
- New-type air and moisture control gives better flavor and appearance to all foods.
- Stain-proof cover.
- Turn-a-knob mechanical cover lifter.
- Deeper roasting pan assures more uniform cooking and better browning.
- Stainless steel covers for all utensils.
- In-built timer clock control optional.

Shipments Soon

The Swartzbaugh Mfg. Company . . . Toledo 6, Ohio

AUTHORIZED WHOLESALERS IN ALL MARKETS

EVERHOT PRODUCTS

ROASTERS.. HEATERS.. APPLIANCES

Germicidal, Sun Lamps (1009)

A new germicidal lamp for poultry and a new sunlamp for human application were announced by General Electric simultaneously with details of the development of a phosphor resembling the powder used in fluorescent tubes and capable of efficiently converting germ-killing waves, generated by low-pressure mercury discharge lamps, into longer ultraviolet rays.

A very thin coating of the white powder on the inner surface of present G-E germicidal lamps produces a combination of germ-killing and health-giving radiations for the poultry lamps. A heavier coating in similar tubes produces the sun lamp.

Two sizes of poultry lamps were announced: The smaller is a 15-watt tubular unit, 18 in. long; the larger a 30-watt tubular, 36 in. long. According to the announcement, they emit ultraviolet in about the following combination: 75% germ-killing "2537" radiation and 25% health-giving "2967" radiation, and may be used in the hen house shielded and positioned so as to irradiate the bird's legs only or mounted to correct height for irradiation of combs and bills. They are interchangeable with regular germicidal lamps in present fixtures.

The sun lamps are tubular shaped; one a 20-watt, 24-in. unit, the other a 40-watt, 48-in. lamp. Both tubes are made of special glass claimed to screen out the few germicidal rays not converted by the phosphor coating into desired radiation found in natural summer sunshine.

F Christmas Tree Lights (1010)

Fluorescent lights for the Christmas tree have been announced by Sylvania for the 1945 holiday season. Made with the same type fluorescent powders as F tubes, the new lamps are small and round and require no special auxiliary equipment for operation. They will be available in four pastel shades, coral, blue, green and maize. They come eight to a string, have a screw type base and are independently operated. A string of F lamps may be added to a string of incandescent Christmas tree bulbs by plugging into the socket. Each lamp burns about five watts of current and has an approximate life of up to 1,000 hours. Because they burn cool, they help to retard tree drying. Designed for indoor or outdoor use, the string will sell for approximately $7.50, with replacement lamps costing 60c each. Royal Electric and Miller Electric companies will manufacture tree sets using these lamps, according to the announcement.

Electric Clocks (1011)

Warren Telechron Co. has announced civilian production of three additional electric clocks to be on the market late in December. The Telalarm Jr. is cased in ivory plastic, has a self starting motor sealed in oil; will retail for $3.95. The Buffet is a kitchen clock cased in red, green, ivory and white and will retail at $3.50. The Embassy, a wood case alarm with a colonial design, is priced at $6.95.

F Lighting Ballasts (1012)

American Transformer Co. has entered the lighting field with introduction of a line of hot and cold cathode fluorescent lighting ballasts. The AmerTran ballast has a roll-turn lead-out said to prevent strain on lead insulation and make wiring easier. This lead-out is of the two-way type and may be attached to exterior or interior channels.

G-E ELECTRIC SINK NEW SOURCE OF BUSINESS FOR MAJOR APPLIANCE DEALERS!

Greatest of All Kitchen Work-savers Being Widely Promoted to Consumers!

Completely Automatic! No trade-ins!

Pioneered by General Electric before the war, the new improved G-E Dishwasher and Disposall are now *completely automatic*, have many new improvements.

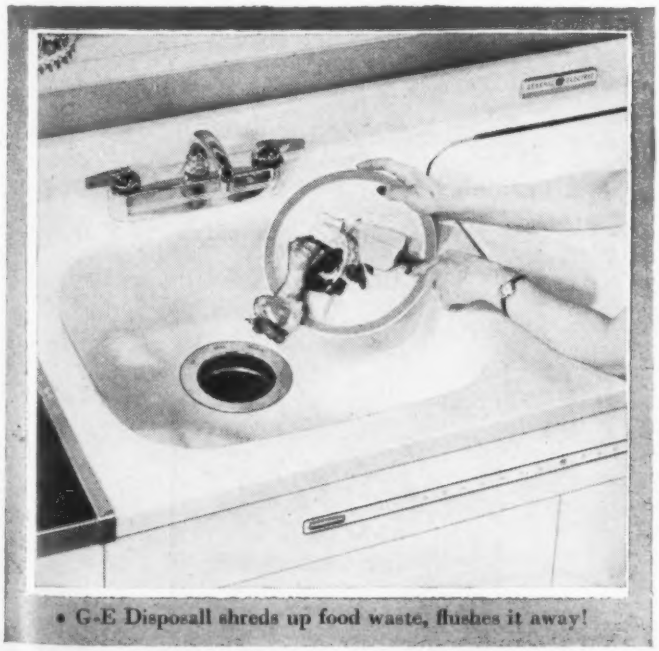
This back saving, hand-saving, foot-saving unit (advertised as the G-E ElectricSink) does more hard work around the kitchen than any other kitchen appliance.

It washes dishes and rinses them (they dry in their own heat), disposes of food waste. All electrically, and all automatically, the G-E Electric Sink is the very "heart" of the America woman's all-electric dream kitchen!

Five sales opportunities available now: (1) G-E Electric Sink (Dishwasher and Disposall); (2) Sink with Dishwasher; (3) Free-standing Dishwasher; (4) Disposall for installation in present sink; (5) Dishwasher for installation in present work surface. *No trade-ins to fuss about!*

We've been advertising the G-E Electric Sink for some time. In *Life*, *American Home*, *Better Homes & Gardens*, *Parents'*, and *Small Homes Guide*. Also plugs on the famous G-E radio show "The G-E House Party." All in all, this represents about *twelve times the amount of prewar promotion for these appliances!*

• G-E Automatic Dishwasher does a day's dishes in a few minutes!



• G-E Disposall shreds up food waste, flushes it away!

Get your information and material from: The General Electric Co., Appliance and Merchandise Dept., Bridgeport, Conn.

DISHWASHERS AND DISPOSALLS®
®REG. U. S. PAT. OFF.
The Complete Table-to-Shelf Dish Job Done Automatically

FOR GOOD LISTENING: *Don't miss Art Linkletter, in "The G-E House Party," every afternoon, Monday through Friday, 4 p. m., E. T., CBS.*

HELP WIN THE PEACE — BUY AND HOLD VICTORY BONDS

GENERAL ELECTRIC

"Don't look now···

···but isn't that a Railley Lamp?"

● Believe it or not, it might very well *be* a Railley Lamp, for Railley is back in lamp production.

Perhaps "production" is too strong a word for what we've been able to do so far. But the volume is growing every day and it won't be *too* long before there are plenty of Railley lamps for everyone.

We've made a most satisfactory start on reconversion. Remembering our experience with conversion *to* war work, we know that reconversion will move slowly at first, then at a rapidly accelerating pace. We can't put a date on it yet—but the day is definitely in sight when Railley Lamps will again grace your selling floor in quantity. And they promise to be the sellingest line of lamps we have ever offered.

Railley

CORPORATION · CLEVELAND, OHIO

ORIGINATORS OF THE PIN-IT-UP LAMP

...only 1 electric range gives your customers all 3....

Mrs. Williams is buying a turkey "that long"—a bird to fit the oven instead of the family's appetite. To obviate such situations we put a generous 18-inch oven in the famous Thermador Electric Range—an oven ample to accommodate even the largest roaster, an oven with no-tilt racks that slide easily to a safety stop—an oven illuminated so you can see what cooks! —But that's not all.

Thermador Electric Ranges provide a 44-inch working top that gives elbow room—30% more elbow room than ordinary electric ranges—But that's not all, either!

Thermador Electric Ranges have a built-in motor-driven fan just below the oven. At the flick of a switch you can warm the kitchen on a nippy morning, or start a gentle breeze when the kitchen gets too hot.

—and of course, Thermador provides all the regular features you'd expect from any modern electric range. Thermador Electric Ranges are built in the West for western living... and they'll be ready one day soon.

If you'd like to handle Thermador Ranges, wire, write or telephone distributor nearest you. But don't put it off—*it won't be long, now!*

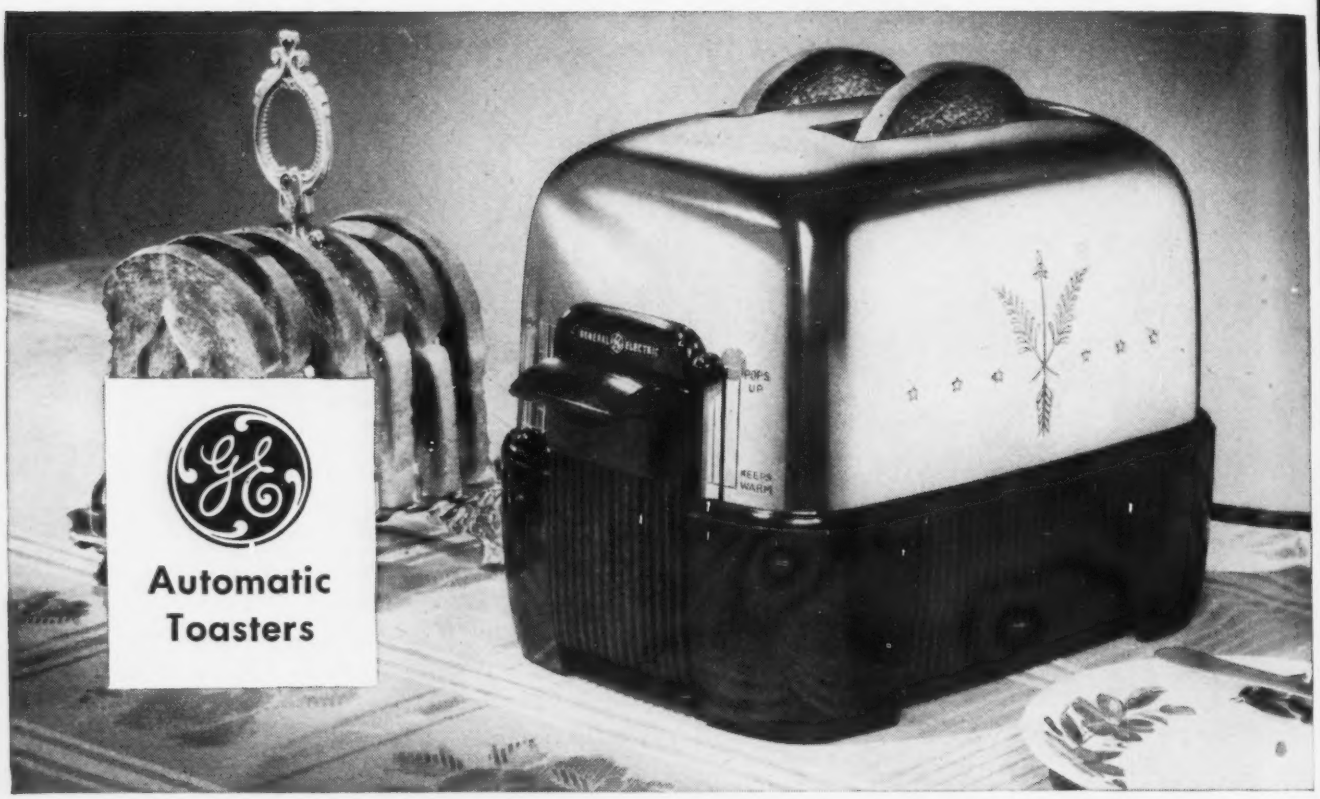
THERMADOR, of course

Seven Leagues Ahead

THERMADOR ELECTRICAL MFG. CO. • 5119 RIVERSIDE DRIVE, LOS ANGELES 22, CALIF.

THERMADOR DISTRIBUTORS: SAN FRANCISCO, FRANK EDWARDS CO. • LOS ANGELES, SUES-YOUNG CO. PORTLAND, EOFF ELECTRIC CO. • SAN DIEGO, STANDARD ELECTRIC CORP.

G-E TOASTERS *have the features women want!*



Completely automatic! Backed by strong national advertising!

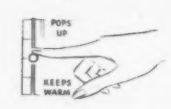
Another General Electrical appliance is back in production—the G-E Automatic Toaster.

This new G-E marvel is streamlined, beautiful. And built into it is the priceless wartime experience gained in the many G-E service centers throughout the country.

Women Want G-E Appliances!

There's a vast market waiting to snap up these G-E Toasters. In fact, a recent survey showed that 53 out of 100 women think General Electric makes the best electrical appliances for the home.

These women have been reading about the G-E Automatic Toaster in big-circulation magazines. They've heard about it on the air. And they're pre-sold on wonderful features like these:

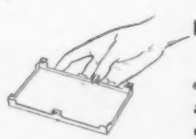


Pops up or keeps warm!

A little knob does the trick! Can be set so that the toast automatically pops up when it's "done," or stays inside the toaster—warm until wanted!

Every slice "as ordered"!

No matter what the user's preference—light, medium, or dark—the toaster can be set that way. Then, every slice—first to last—is toasted to exactly the same degree of golden-brownness.



New snap-in crumb tray!

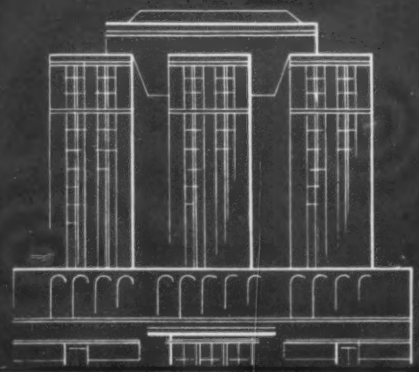
Women asked for this feature, and *only G.E.* has it! A crumb tray snaps in and out in a twinkling—can be easily, quickly brushed off and replaced.

Get set *now* to cash in on this profitable, popular G-E appliance. See your G-E distributor today. General Electric Company, Appliance and Merchandise Department, Bridgeport, Conn.

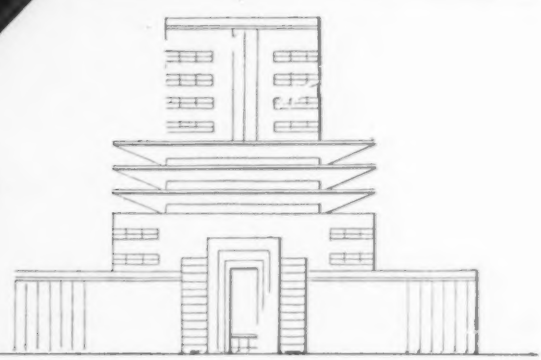
TELL YOUR CUSTOMERS to listen to Art Linkletter, in "The G-E House Party," every afternoon, Monday through Friday, 4 P. M., E. W. T., CBS.

"The Appliances Most Wanted by Most Women"

GENERAL ELECTRIC



Re-wiring of existing structures



and wiring of new buildings

in the post-war era will call for electrical materials that will carry a burden of demand far beyond today's expectations. Such insurance in building wiring and raceways, such extra inherent quality are certain when the National Electric System of wires, cables and raceways is employed. Specify National Electric products for all electrical wiring requirements in domestic and commercial buildings. Our 350 page handbook of electrical products and engineering data is available on request.

NATIONAL
ELECTRIC PRODUCTS
WIRING SYSTEMS
WIRES AND CABLES

CONDUITS—RACEWAYS
WIRE AND CABLES FOR
EVERY PURPOSE

National Electric
PRODUCTS CORPORATION
Pittsburgh, Pa.

MORE SALES AND PROFITS FOR YOU

Production of Electromodes Doubled for This Season

•

The All-Electric Unit Heater

•

Nationally Advertised in Leading Industrial Publications

Easily Installed—Safe—Economical

Models 10 to 60 KW are for suspension mounting only.

The 1.5 to 7.5 KW models are for either portable use or suspension mounting.

Last year's deliveries of Electromode Heaters to industry had to be restricted because of the continued heavy demand by both Army and Navy. Recently, however, it has been possible to divert more of our facilities to production for general use and Electromodes are now available in greater quantities.

Already, many leading wholesalers are selling Electromode Unit Heaters and additional deliveries will be made as quickly as possible to all who place their orders early.

Electromode Unit Heaters have enjoyed increasing sales popularity because they feature *All-Electric,* safe heating with flexibility of application and the exclusive patented Electromode Heating Element. This is the same Element which has proved so reliably safe in the heating of U. S. Submarines.

Capacities of Electromodes range from the small 1.5 KW, for either suspension or portable mounting, to the 60 KW designed for suspension mounting only. They are simple to install—just like an electrical fixture—wherever circuit wires can be run. Furthermore, there are no piping or piping connections to maintain, and no heat-loss en route to heaters. Electromodes are 100% efficient from every heating standpoint and they assure you of 100% goodwill with every sale plus plenty of repeat business. ELECTROMODE CORPORATION, Div. of American Foundry Equipment Co., 436 South Byrkit Street, Mishawaka, Indiana.

THE HEART OF ELECTROMODES

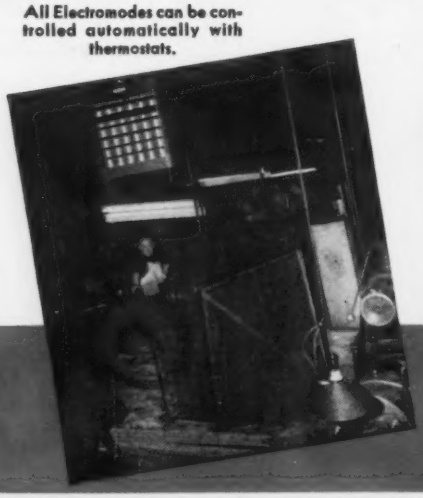
Electromodes owe their great efficiency, long life, freedom from fire or explosion hazard to the patented heating element. There is no oxidation, no exposed glowing wires because the resistor is encased in a tubular sheath which, in turn, is totally embedded in a one-piece, finned aluminum casting.

ELECTROMODE
Electric Unit Heaters

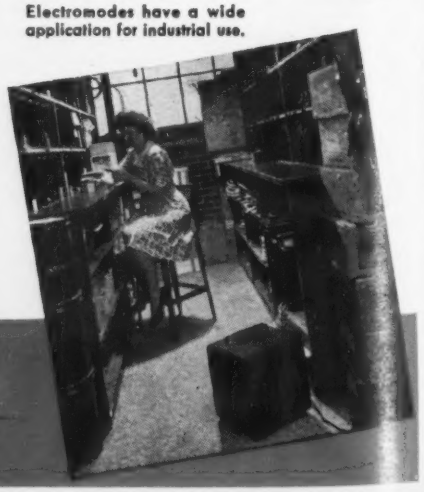
New illustrated Bulletin 45-U just off the press. Copy sent on request.

No fuss, no noise, no maintenance with Electromodes—just good clean heat.

All Electromodes can be controlled automatically with thermostats.



Electromodes have a wide application for industrial use.



WHY IS HE HAPPY?*

PATENTED

IF IT'S A ROASTER RANGE IT'S A Monarch ELECTRIC

Ideal for roasting, complete meals. Convenient height, no stooping.

Use for casserole dishes and light baking. Saves use of regular oven.

High-dome cover increases depth of roaster for hams, turkey, etc.

When closed roaster compartment lid is flush with cooking top.

* He's happy because he's got a Monarch Roaster Range franchise. Consumer excitement about this new Monarch Electric Range is mounting at such a terrific pace that only one deduction is possible: the Monarch Roaster Range will command a top sales position in the post-war era now at hand.

Write for exclusive franchise particulars.

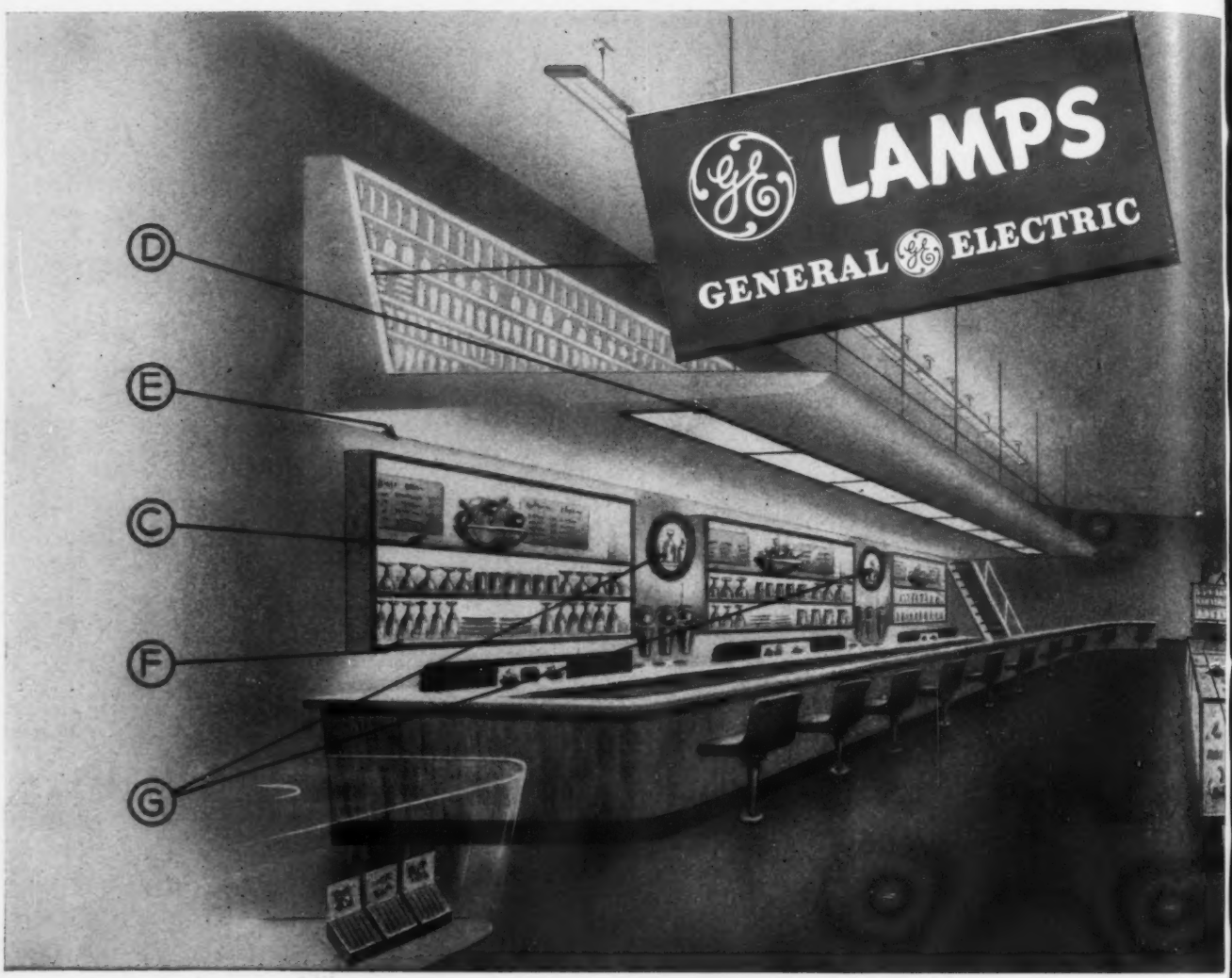
COAL - WOOD, ELECTRIC, GAS and COMBINATION RANGES

Monarch - Paramount

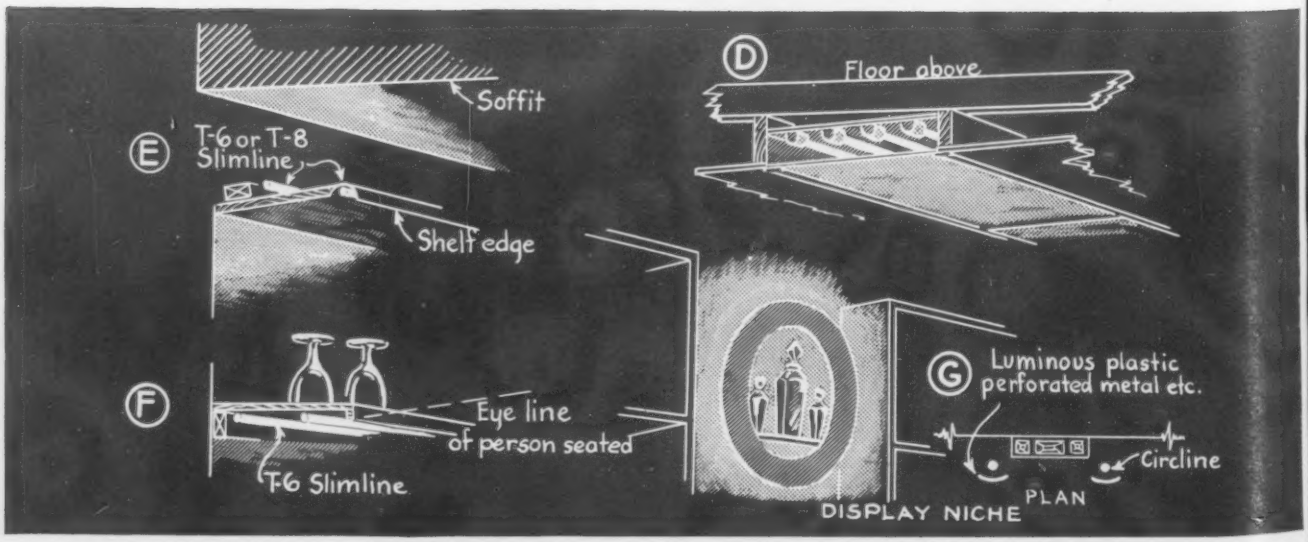
RANGES AND HEATERS

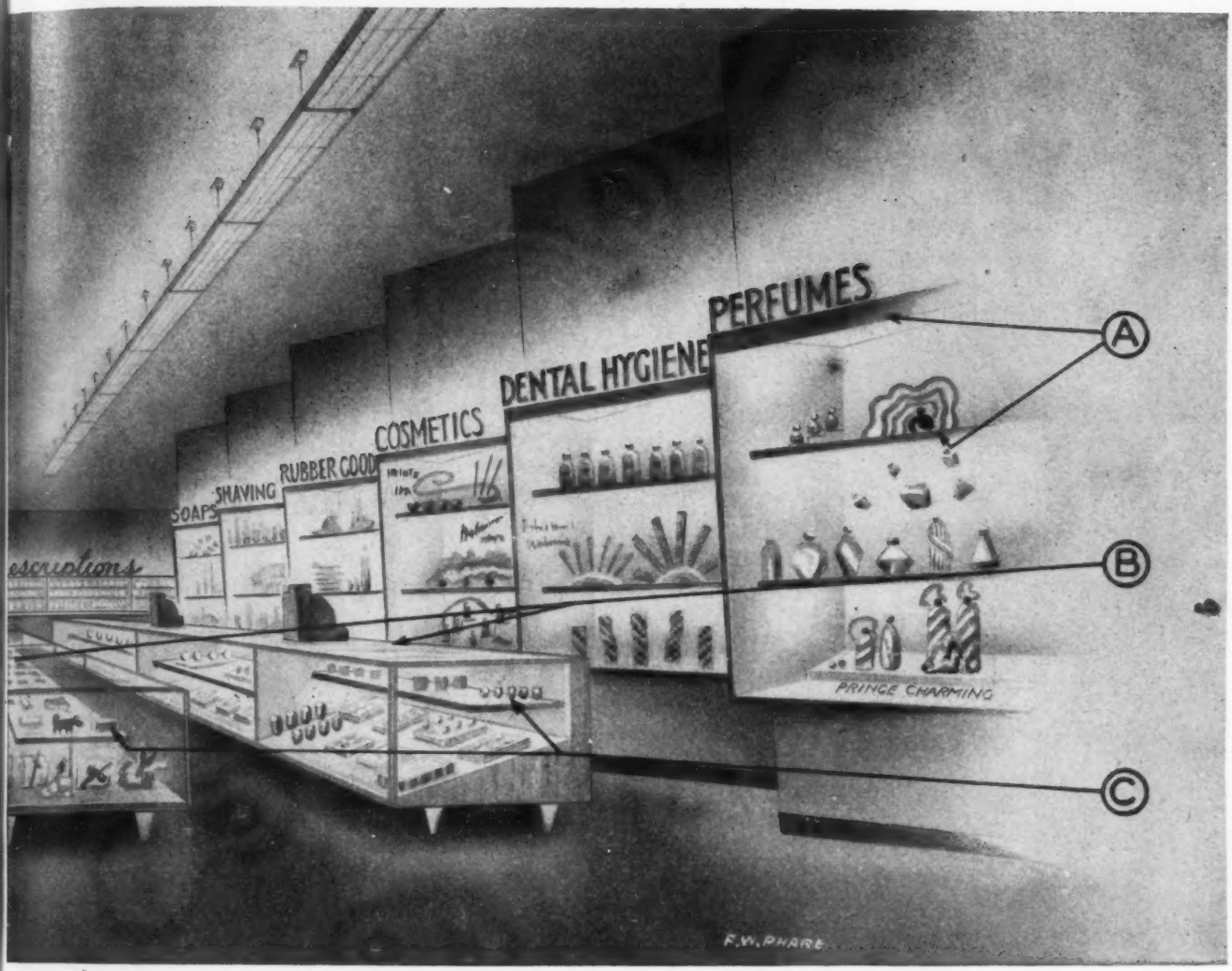
MALLEABLE IRON RANGE CO.

3905 LAKE STREET BEAVER DAM, WISCONSIN



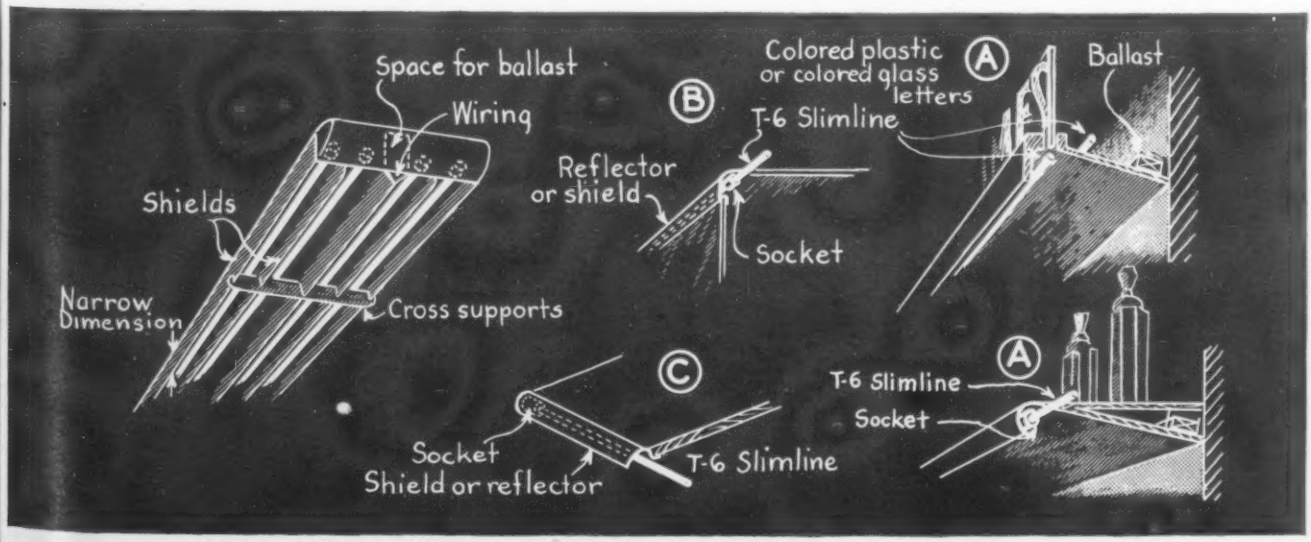
How the new G-E SLIMLINE and CIRCLINE Lamps will increase store lighting profits!





NEW fluorescent light sources from G-E Lamp Research will help you do the biggest store lighting business in history. These ideas for the use of G-E SLIMLINE and CIRCLINE Fluorescent Lamps in a drug store are adaptable to almost any kind of store lighting job. *Seeing is the biggest thing in selling,* and this is lighting that sells. Study these ideas . . . let them help you make your store lighting jobs outstanding.

G-E's new SLIMLINE Fluorescent Lamps are being made available in four lengths. 42, 64, 72, and 96 inches. The first two are ¾″ in diameter, the other two are one inch. The first G-E CIRCLINE Fluorescent Lamp (ready early in 1946) will be 12″ in outside diameter, with a tube diameter of 1¼″. Two additional circular lamps are planned, with outside diameters of 8½″ and 16″. Watch for further announcements.



• RUBBER POWER CABLES • VARNISHED CAMBRIC CABLES •

PERMACORD • LEAD-ENCASED AND PARKWAY CABLES • SYNTHOL WIRES • WELDING CABLES • SHIPBOARD CABLES •

• ARMORED CABLE • CRESFLEX NON-METALLIC SHEATHED CABLE • SERVICE CABLE • CRESCORD • BUILDING WIRE

CRESCORD

RUBBER JACKETED PORTABLE CORD

For Long Service On Tough Jobs

CRESCORD comprises two, three or four flexible copper conductors, with color-coded, heat-resisting, rubber insulation under a tough, synthetic rubber jacket. It is flexible, highly resistant to abrasion, crushing, cutting, water, weather and sunlight.

Type S CRESCORD has a heavy jacket for maximum life on portable drills, tools and industrial equipment.

Type SJ CRESCORD has a lighter jacket for use on household and office appliances. It is made in sizes No. 18 and No. 16 AWG only.

Type SV CRESCORD is a small, light, extremely flexible cord for use on household vacuum cleaners. It is made in size No. 18 AWG only.

CRESCENT

WIRE and CABLE

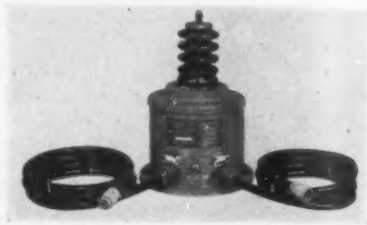
CRESCENT INSULATED WIRE & CABLE CO.
TRENTON, N. J.

• IMPERIAL NEOPRENE JACKETED PORTABLE CABLES •

Capacitance Voltage Dividers (1013)

Capacitance voltage dividers for measurement and wave-form observation of high-frequency voltages in the 15,000- to $50,000-volt range have been announced by General Electric. The line is available in ratings for 15,000-, 35,000- or 50,000-volt peak pulse levels and each divider may be secured with two independent voltage ratios of any desired value, for simultaneous pulse measurement and wave-form observation.

Essentially, the units consist of a high-voltage, ceramic bushing, which constitutes a low value of capacitance, in series with one or more standard, molded type Lectrofilm capacitors, assembled in a hermetically sealed tank. They can be supplied with either microphone type cable leads, having suitable screw-in terminals, or with connectors for attachment of coaxial cable.



Kriston Plastic (1014)

Kriston, a new non-flammable thermoset plastic said to have high electrical and optical properties, has been announced by the B. F. Goodrich Chemical Co. This product is formed by polymerizing liquid monomer in the presence of a suitable calalyst. According to the announcement, it has good resistance to abrasion and high resistance to oils and greases and most chemicals, including acids and alkalies. Electrical applications suggested by the manufacturer are for insulators, control knobs, handles, panels or other molded insulating parts, especially in the high-frequency range. The company plans to offer Kriston only in the liquid monomer state and does not expect to do any fabrication but states that it is anxious to work closely with manufacturers in developing new products from the raw material.

Silicone Varnish (1015)

Dow Corning has announced a silicone varnish for electrical equipment, designated as DC 996. According to the announcement, this varnish has a curing temperature of 300°F. and is heat stable and waterproof. It is stated that electrical equipment wound with silicone insulating materials and sealed by impregnating with DC 996 with have the thermal stability and waterproof characteristic of silicone insulation. The temperature required to cure the varnish does not affect shellac-bonded mica or core plating, according to the manufacturer.

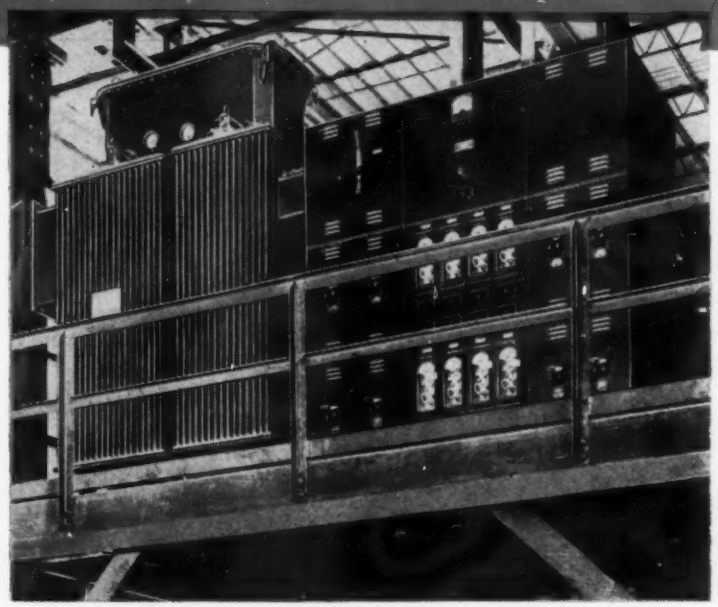
Tool (1016)

Burndy has developed a foot-operated Hytool for installing its indent type connectors on electrical wire and cable, No. 22 to 10. Designed to fill a gap between power-operated tools and hand-operated pliers, this device has a wide jaw opening and front feed; is said to require only a small amount of foot pressure for operation. A terminal is completely attached to the cable in a single stroke of the machine, during which the insulation grips are closed and the terminal barrel is indented onto the cable. Each set of dies takes three connector sizes.

Wagner Unit Substations

PERMIT CENTRALIZED POWER LOADS THUS ELIMINATING MANY SEPARATE UNITS . . .

Wagner unit substations, consisting of transformers coupled to switchgear having any desired combination of circuit-breakers, meters, etc., can be supplied to meet any industrial load requirement. They can be installed indoors or outdoors, right at the load centers.



1200-kva Wagner unit substation installed on a balcony.

CONSIDER THESE ADVANTAGES

1. Transformer and switchgear are compactly and integrally built, eliminating scattering of units and unsightly overhead equipment.
2. Simplified installation. Complete substation is shipped in one or more factory-assembled units, completely wired, ready for installation and final connection.
3. Improves performance of motors and lights. Inherent linedrop is avoided by eliminating long low-voltage feeders.
4. Saving of copper in connecting cables. Locating the transformer near the load allows the use of shorter and smaller cables over a great part of the distance.
5. Low maintenance expense. The complete enclosing of the fuses and other equipment practically eliminates cleaning and dust problems and assures safety against contact with live parts.
6. Provides flexibility to meet future conditions.
7. Can be installed indoors without the use of expensive fireproof vaults.

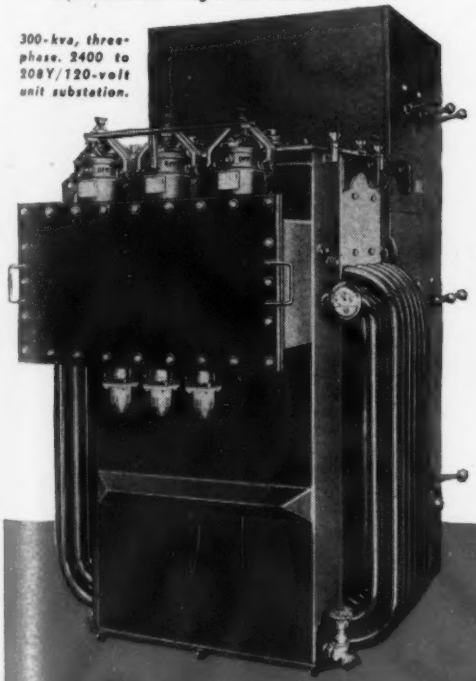
Ask for Bulletin TU-180 which describes Wagner unit substations as well as the complete line of Wagner distribution transformers.

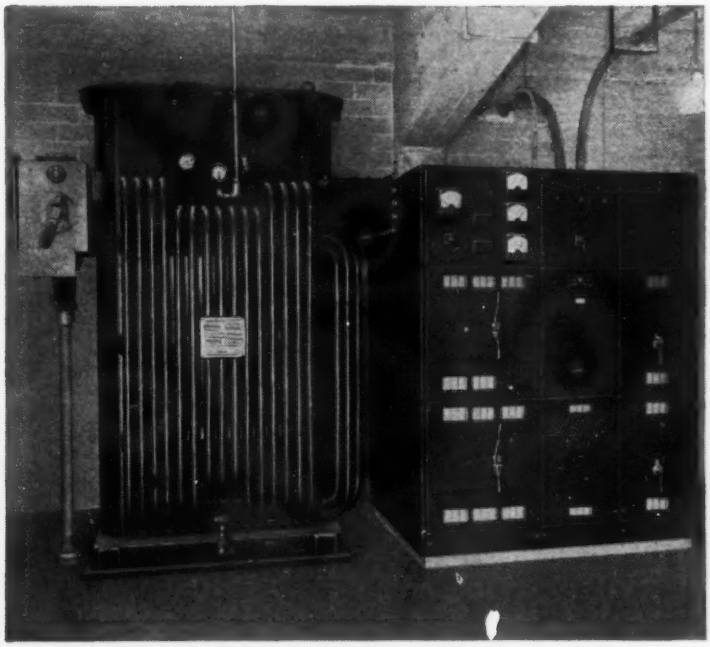
THESE BRANCHES ARE READY TO SERVE YOU

Wagner maintains the following 29 branches for your convenience: Atlanta 3, Baltimore 18, Boston 15, Buffalo 8, Chicago 16 Cincinnati 10, Cleveland 15, Dallas 1, Denver 2, Detroit 2, Houston 2, Indianapolis 4, Kansas City 8, Los Angeles 15, Memphis 3, Milwaukee 2, Minneapolis 4, New York 7, Omaha 2, Philadelphia 8, Pittsburgh 13, Portland 9, Salt Lake City 1, San Francisco 3, Seattle 4, St. Louis 3, Syracuse 2, Tulsa 3, Washington D. C. 5.

Each of these offices is manned by trained field engineers. They will gladly show you how you can economize on your power requirements with Wagner Unit Substations.

300-kva, three-phase, 2400 to 208Y/120-volt unit substation.





750-kva, three-phase, 13200 to 480-volt unit substation.

T45-24

Wagner Electric Corporation

ESTABLISHED 1891

6381 Plymouth Avenue, St. Louis 14, Mo., U. S. A.

In Canada: Wagner Electric at Leaside, Ontario

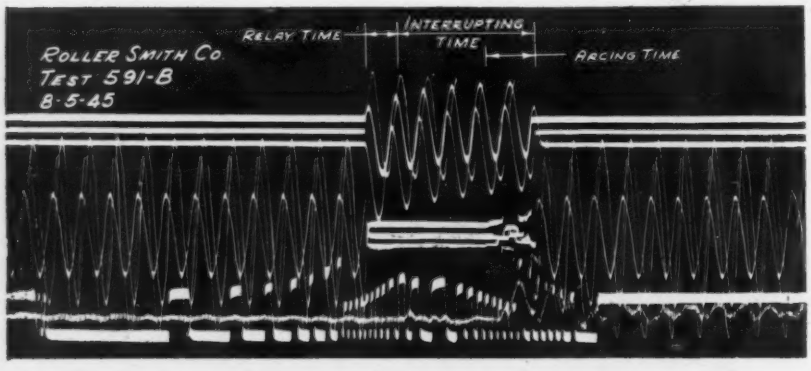
ELECTRICAL AND AUTOMOTIVE PRODUCTS

ROLLER SMITH

"ON THE LINE" TEST STATION PROVIDES KEY TO SECRETS OF ARC EXTINCTION

THE new Exotherm principle of arc extinction discovered by Roller-Smith engineers puts arcs out faster because it harnesses the properties and energy of the gases produced when the arc is struck.

The discovery of the Exotherm principle grew out of the efforts of Roller-Smith engineers to reconcile conventional laboratory tests of breakers with performance "On the Line." The only answer seemed to be "On the Line Testing" of breakers. Through cooperation of the utility industry the first "On the Line" test station of its kind was established by Roller-Smith to seek out the real facts about oil circuit breaker performance. Because the tests were conducted under actual operating conditions, the full value of recovery voltage, both normal and transient, came into play. For the first time conflicting theories and claims about arc extinction could be tested under actual service conditions. After hundreds of tests "On the Line," provided information never before available, the Exotherm principle of arc extinction was discovered. A chamber in which the arcing takes place confines the gas, compresses it, and correlates the thermal and pressure characteristics to obtain rapid arc extinction.



Typical test oscillogram of Roller-Smith oil circuit breaker employing Exotherm principle. Note 5 cycle interrupting time.

Roller-Smith oil circuit breakers with the Exotherm principle give consistent 5 cycle operation; little or no burning of contacts and low pressures inside the tank. 5 cycle operation means better protection to equipment with resulting savings. Making use of the arc energy results in less contact burning and less oil sludging, saves inspection and maintenance. Low tank pressure results from the Exotherm principle because the gas is cooled and contracted before it gets into the tank. The result —far greater safety for indoor operation than ever before.

For full information on the Exotherm principle applied to Roller-Smith oil circuit breakers, write to dept. EW.

ROLLER SMITH

Oil Circuit Breakers

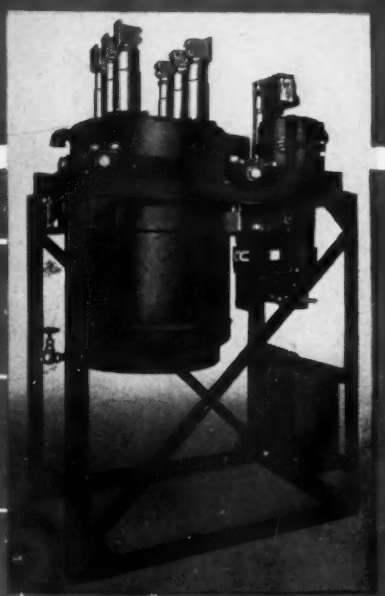
BETHLEHEM • PENNSYLVANIA

In Canada: Roller-Smith Marsland, Ltd., Kitchener, Ontario

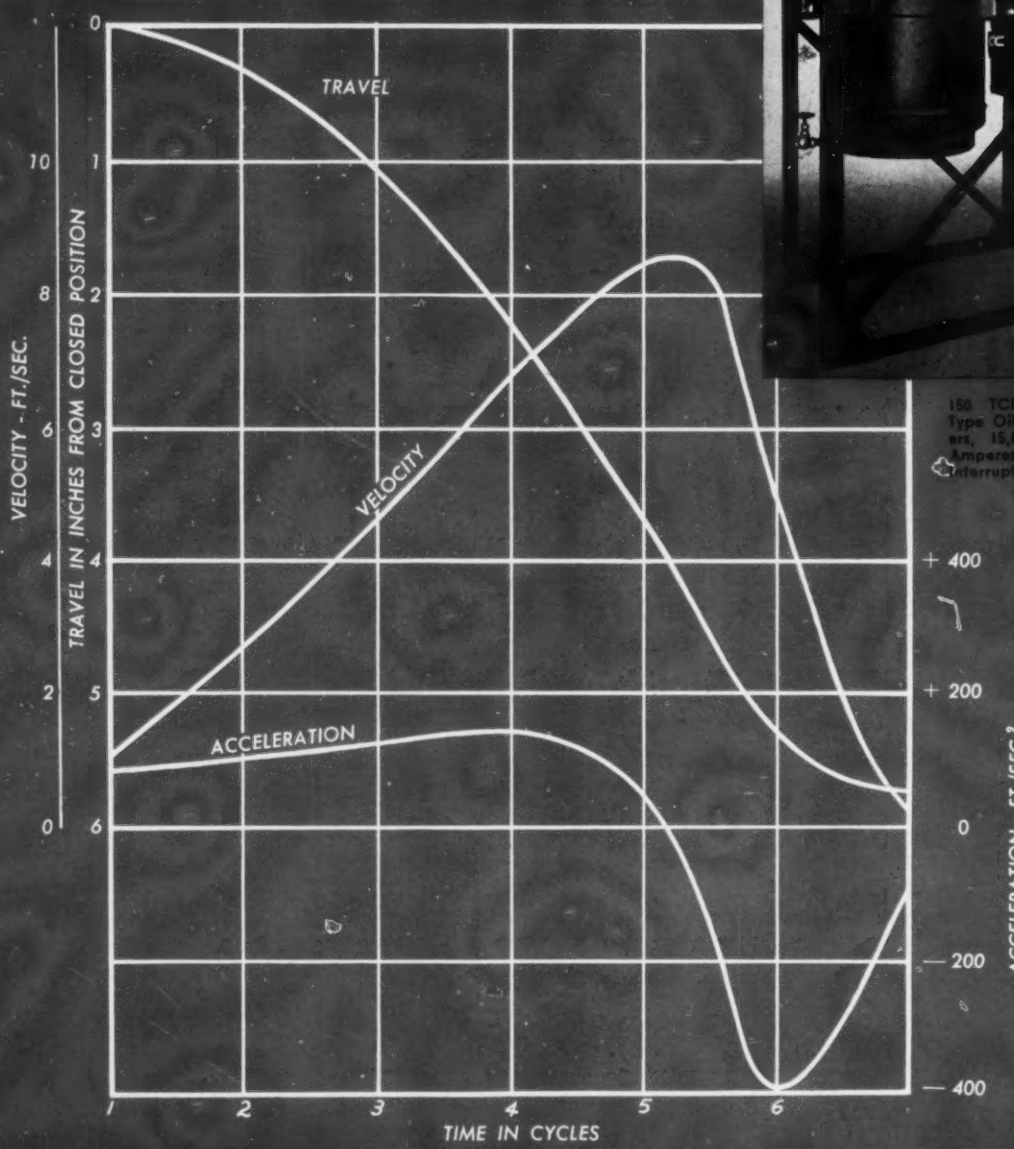
STANDARD AND PRECISION ELECTRICAL INSTRUMENTS • AIRCRAFT INSTRUMENTS • SWITCHGEAR
AIR AND OIL CIRCUIT BREAKERS • ROTARY SWITCHES • RELAYS • PRECISION BALANCES

Announces

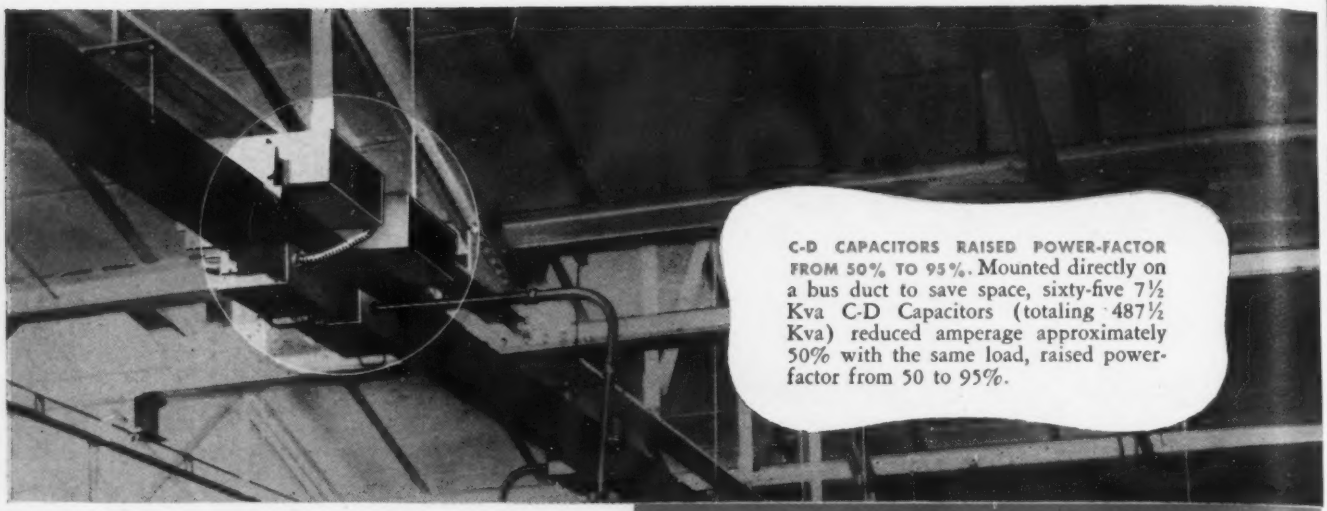
The New EXOTHERM principle of Arc Extinction...



150 TCR 5 Exotherm Type Oil Circuit Breakers, 15,000 Volts, 1200 Amperes, 150,000 KVA. Interrupting Capacity.



Curves of acceleration, velocity and arcing time derived from breaker test oscillogram.



C-D CAPACITORS RAISED POWER-FACTOR FROM 50% TO 95%. Mounted directly on a bus duct to save space, sixty-five 7½ Kva C-D Capacitors (totaling 487½ Kva) reduced amperage approximately 50% with the same load, raised power-factor from 50 to 95%.

Meet Demands for More POWER Quickly, Economically, with C-D CAPACITORS

for Power-Factor Improvement

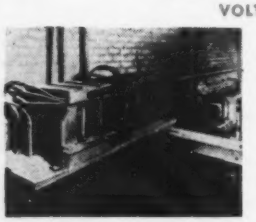
C-D Dykanol Capacitors are compact, flexible, quickly installed, quickly obtained. They can be installed without changing or adding to present system or disrupting production. Our engineers will be glad to estimate the increased power capacity and savings possible in your plant.

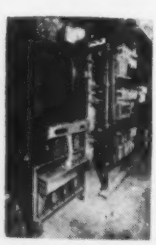
SEND FOR C-D's TIME-SAVING VECTOR CHART for determining capacitor KVAR required to increase power-factor to any desired value. It's free on request. You'll find it valuable — simple to use. Write Cornell-Dubilier Electric Corporation, South Plainfield, New Jersey.

HERE'S HOW OTHER MANUFACTURERS HAVE INCREASED LOAD CARRYING CAPACITY OF PRESENT SYSTEMS . . .

C-D CAPACITORS MINIMIZE OVERHEATING. The overloaded feeders, motors and switchboards of a machinery manufacturer were running hot and blowing main fuses several times a week. After C-D Capacitors were installed, overheating was materially reduced and since then, no fuses have been blown.

C-D CAPACITORS RAISE THE SYSTEM VOLTAGE LEVEL. At a large industrial plant, low power-factor was the cause of considerable voltage drop in the feeders. C-D Capacitors raised voltage level and secured better operating conditions, greatly increasing efficiency throughout the plant.



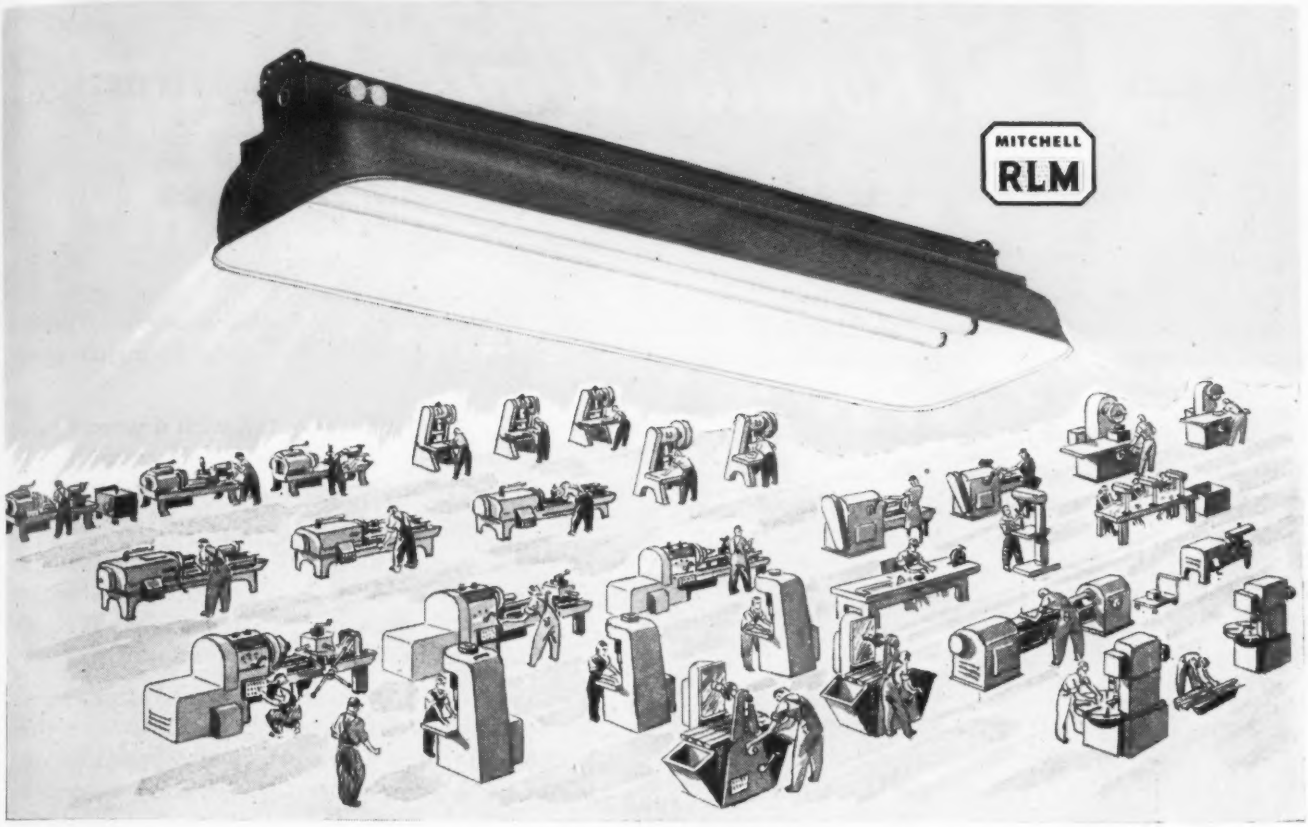


C-D CAPACITORS IMPROVED POWER-FACTOR FROM 77.9% TO 94%. A floor mounting capacitor bank of 95 Kva, 460 volts, near the switchboard improved power-factor from 77.9% to 94%. Feeder load capacity increased from 200 to 230 Kw. Feeder Kva decreased from 265 to 250. C-D Capacitors completely liquidated their cost in power bill savings in 14 months.

Cornell-Dubilier Capacitors

FOR POWER-FACTOR IMPROVEMENT

CARRIER CURRENT COUPLING • SURGE PROTECTION



Miles and Miles of MITCHELL *Lighting Serve Industry Today*

THIS WIDESPREAD POPULARITY HAS BUILT VOLUME BUSINESS AND GOODWILL FOR DISTRIBUTORS AND CONTRACTORS EVERYWHERE.

Across the country . . . in plants of all types . . . thousands of MITCHELL fluorescent fixtures work hour after hour . . . day after day. In single units. In continuous rows.

Because of MITCHELL-engineered lighting efficiency . . . employees *see* better . . . *feel* better . . . *work* better. Because of MITCHELL design . . . easier installation and maintenance *cut service costs* and *save manpower.*

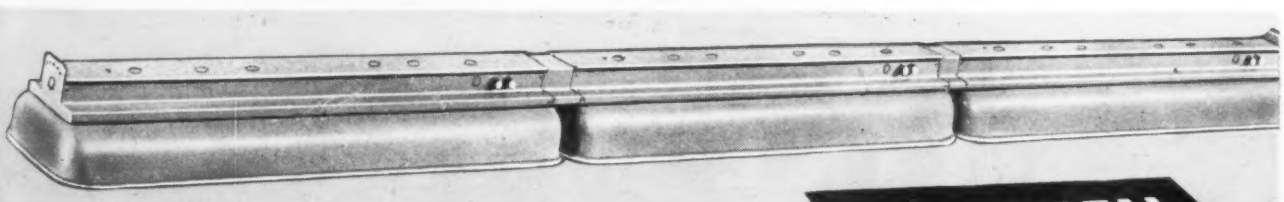
For these very reasons . . . Distributors and Contractors find MITCHELL Lighting easier to sell . . . certain to satisfy.

Tomorrow . . . MITCHELL accomplishments of today will mean *constant and growing* sales . . . *surer and greater* profits!

Makers of
Industrial and Commercial Fluorescent Lighting Equipment
Store Window Lighting • Spotlights and Floodlights
Desk Lamps • Portable Floor and Table Lamps
Bed Lamps • Ultraviolet and Infrared Health Lamps
Residential Lighting Specialties

USE THESE SALES AIDS!

Write for full-size Catalog No. 281 and Pocket-size Catalog No. 290. Each tells full story of industrial units . . . each builds sales.



Mitchell Manufacturing Company
2525 CLYBOURN AVENUE, CHICAGO 14, ILLINOIS
West Coast Factory and Sales Office: 1019 N. Madison Ave., Los Angeles 27, Cal.

MITCHELL
FIRST IN POPULARITY

How LM Round Wound Construction ended loss-juggling compromises

For years transformer design was a series of compromises. Cutting one loss increased another; cutting original cost raised operating cost; lower voltage drop meant higher exciting current or higher cost.

Careful study convinced many engineers that copper loss should be reduced to gain lower voltage drop, in order to deliver more uniform voltage to the customer. This, however, increased the flux density and core loss, and resulted in higher exciting current. Better regulation was gained, but only at higher operating costs.

Core efficiency could be raised with a wound core; but cutting or unwinding the core after annealing to put on the coils opened up air gaps, disturbed the flux, and lost much of what the wound core gained.

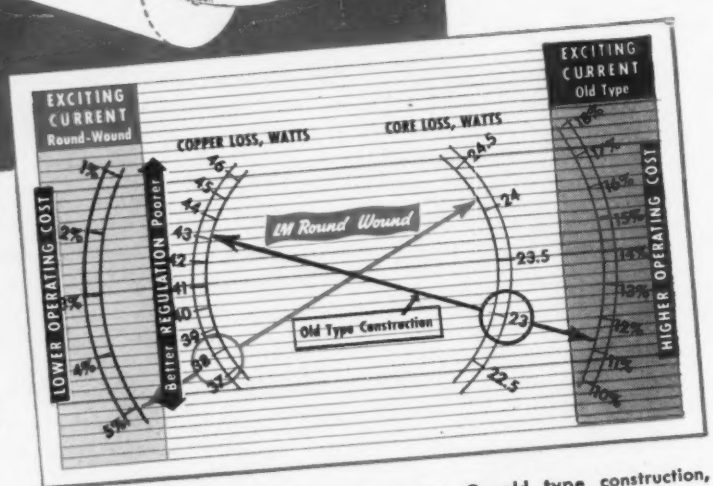
It was not until Round-Wound construction was developed by L-M engineers, with its method of winding round coils right onto the core, that the benefits of this ideal core were realized.

This method left the core undisturbed after annealing—practically free from air gaps. It was thus possible to reduce turns for lower copper loss, and still make a transformer with exciting current as much as 50% lower, and with improved regulation at *all* power factors.

Other desirable results—uniformly higher impulse strength, greater short-time overload capacity—are inherent in the method of winding, the long, round coils, generous, undisturbed insulation, highly efficient cooling.

The result: a transformer that lowers operating and maintenance costs; gives extra years of service; and delivers better service to the customer and more profit to the operator.

Round-Wound construction provides practically ideal magnetic circuit; long, round coils, wound at even tension and not forced into square shape; generous undisturbed insulation; large cooling surfaces, plus cooling passages wound into coils and between coils and core.

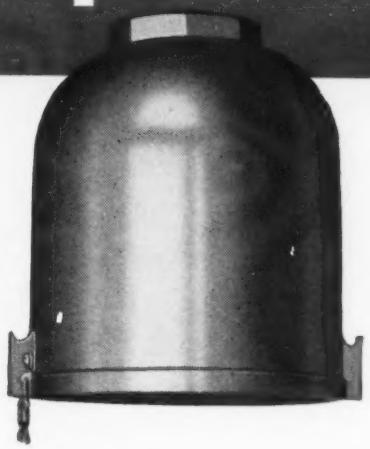


As copper loss is lowered, core loss goes up. On old type construction, exciting current was raised beyond desirable limits. (Grey section of chart.) The blue section shows how Round-Wound construction made it possible to reduce copper loss still further; and still have far lower exciting current.

L-M Round-Wound Transformers are available in 1½ to 25 Kva, 2400 to 7620 volts. Meet latest EEI-NEMA standards. For details ask L-M Field Engineer; or call or write L-M branch or Line Material Company, Milwaukee 1, Wisconsin.

LM
LINE MATERIAL
TRANSFORMERS
L-M DISTRIBUTION EQUIPMENT INCLUDES: Distribution Transformers · Fuse Cutouts and Fuse Links · Lightning Arresters
Oil Switches · Pole Line Hardware · Line Construction Specialties · Underground Equipment · Fibre Conduit · Street Lighting Equipment

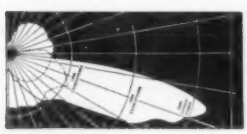
The way it's designed makes L-M Spherolite EASY to service



It's so easy to service L-M Spherolites that you almost wish they needed servicing more often. But the V-Band holder keeps the glassware snugly close to the reflector, and the toggle latches keep the reflector tight to the accurate seat in the hood. Even gaskets aren't necessary. Moisture, dirt, and bugs stay out. But where servicing *is* necessary, it's easy to do, at either of two points.

How Spherolite AIMS the Light

The chart compares the distribution of light by a bare lamp, a radial bowl, and the L-M Spherolite with Holophane refractor. Light is aimed in the desired direction by the scientifically-designed Alzak aluminum reflector and the Holophane one-piece glass refractor.



Service Here . . . with Toggle Latch

For replacing a burned-out lamp, simply release the coil spring toggle latches, lift them off the hood, and allow reflector to hang by chain. Weatherproof joint, with accurately machined reflector seat, requires no gasket.

Service Here . . . with V-Band Holder

To replace glassware, simply loosen the two take-up screws of the V-Band. Slip out the old glassware and slip in the new; no need to replace complete reflector-glassware assembly. V-Band provides a positive weather-proof seal between reflector and glassware; no gasket required. Latch type holders are also available.

Get this Bulletin 4432

Helpful information on street lighting; details on Spherolite; description of L-M Illuminating Engineering Service. Ask the L-M Engineer for a copy or write *Line Material Co., Milwaukee 1, Wisconsin.*

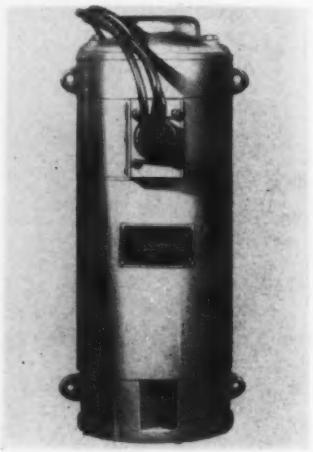
LINE MATERIAL
STREET LIGHTING EQUIPMENT

L-M DISTRIBUTION EQUIPMENT INCLUDES: Distribution Transformers · Fuse Cutouts and Fuse Links · Lightning Arresters · Oil Switches · Pole Line Hardware · Line Construction Specialties · Underground Equipment · Fibre Conduit · Street Lighting Equipment

Available with or without hanger. Uses four 40 W. fluorescent lamps.
PLASCOLIER
A new shielded luminaire that is now in production by Smoot-Holman. Extremely efficient, combining minimum surface brightness, maximum diffusion, low absorption. Lightweight plastic diffuser is safe to handle, no breakage hazards. Write for Catalog Supplement No. 22.
SMOOT-HOLMAN COMPANY
SMOOT-HOLMAN
INGLEWOOD, CALIFORNIA
MADE IN U.S.A.
Offices in Principal Western Cities—Branch and Warehouse in San Francisco

Inverter (1017)

A totally enclosed, splash proof inverter is being manufactured by Electrical Engineering and Mfg. Corp. It was designed originally for marine application but is said to be applicable where small amounts of alternating current are required from a d-c power supply. It converts 32-volt d-c current into 110 volt 60-cycle a-c current; is rated at 500 va., continuous duty, with 900 va. peak, intermittent duty. It can be adapted for use with a 110-volt d-c supply.



Pressure Sensitive Device (1018)

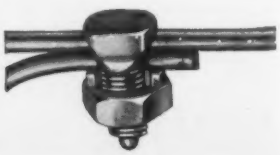
Baldwin Locomotive Works has developed a pressure sensitive device for conversion of gas or liquid pressure to electrical energy for measuring, recording or controlling. The instrument is said to have an accuracy of one-fourth of one per cent of full scale and is available in several ranges up to 0-to-20,000 lb. per sq. in. Designated as the SR-4 pressure sensitive device, it is based on the principle of the SR-4 strain gauge. It is hermetically sealed and a built-in compensator is said to cancel out the effect of any extraneous force such as temperature. It is approximately one inch in diameter and 5½ in. long.

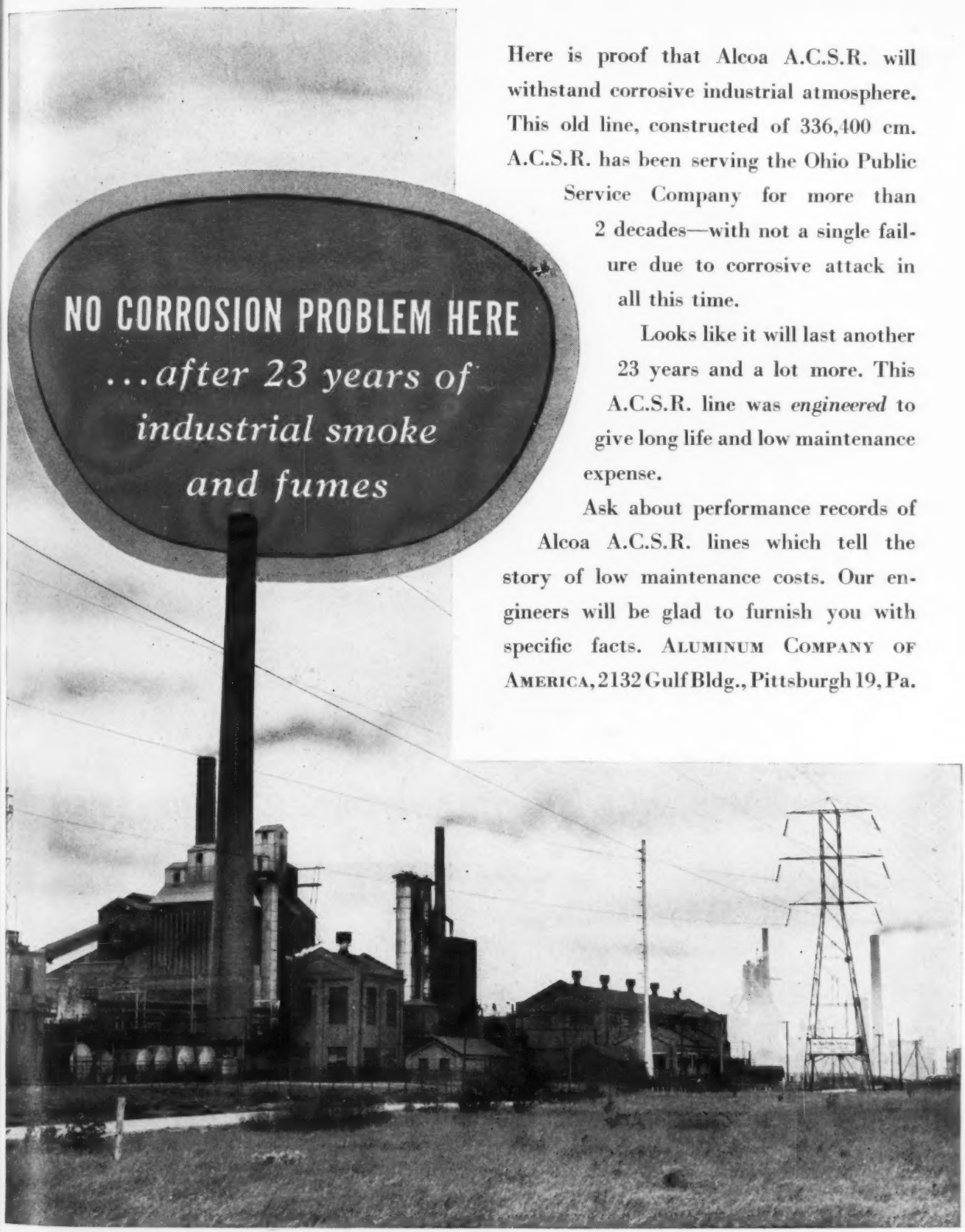
Cementless Bushings (1019)

Cementless transformer bushings are announced by Pennsylvania Transformer Co. in voltage ratings of 5,000 and 15,000 volts and current ratings from 500 to 3,000 amp. All joints between porcelain and metal parts are sealed by clamping. A laminated connector on the lower end of the bushing conductor is attached to the transformer leads, and is said to eliminate stress caused by thermal expansion. Power bushing rating is 7,500, 15,000 and 25,000 volts with a current rating of 440 amp. Either a spade or clamp type terminal for bus connection may be used.

Connectors (1020)

Reliable Electric Co. has made available forged bolt connectors in five sizes, for No. 9, 6, 4, 2 and 1 solid wire. It is stated that these connectors have the same efficiency as the machined type and have a higher copper content.





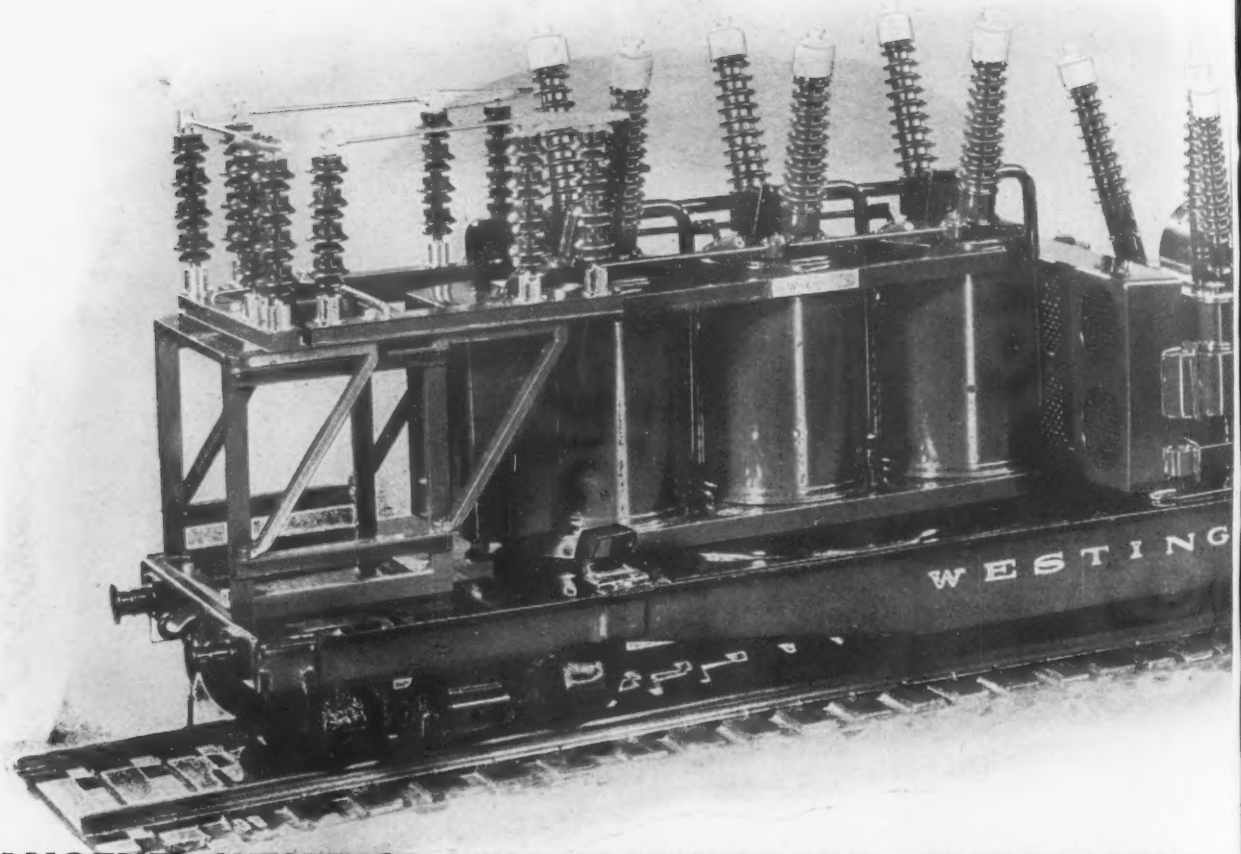
Here is proof that Alcoa A.C.S.R. will withstand corrosive industrial atmosphere. This old line, constructed of 336,400 cm. A.C.S.R. has been serving the Ohio Public Service Company for more than 2 decades—with not a single failure due to corrosive attack in all this time.

Looks like it will last another 23 years and a lot more. This A.C.S.R. line was *engineered* to give long life and low maintenance expense.

Ask about performance records of Alcoa A.C.S.R. lines which tell the story of low maintenance costs. Our engineers will be glad to furnish you with specific facts. ALUMINUM COMPANY OF AMERICA, 2132 Gulf Bldg., Pittsburgh 19, Pa.

ALCOA A-C-S-R
ALUMINUM CABLE STEEL REINFORCED

portable power . . TO



ANOTHER WESTINGHOUSE TRANSFORMER ACHIEVEMENT

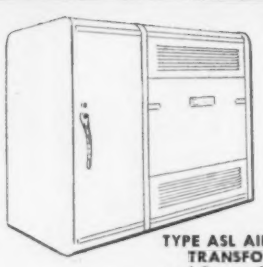
When the lights go on again in war-torn areas . . . complete, compact high-voltage substations—self-contained within the confines of a standard railway flat-car—will stand ready to move on a moment's notice. They arrive ready to work as quickly as connections can be made.

Flatcar-mounted mobile substations are one of many difficult application problems that Westinghouse has been called on to engineer and produce.

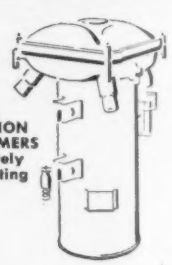
Solving transformer problems like this has given users of standard Westinghouse Transformers many important advantages. Loading-by-copper-temperature is one . . . Hipersil—the weight-reducing, high-permeability steel—is another. The Completely Self-Protected CSP Transformer is a third.

The chances are 100 to 1 that you will find in the complete range of standard Westinghouse types and ratings a readily available answer to your transformer problem. These standardized designs include the best of the features and details that so often have contributed to solving some special transformer application problem. Consult your Westinghouse representative or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

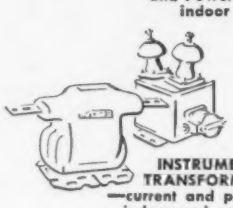
J-70457



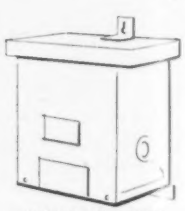
TYPE ASL AIR-COOLED TRANSFORMERS and Power Centers for indoor service



CSP DISTRIBUTION TRANSFORMERS —completely self-protecting



INSTRUMENT TRANSFORMERS —current and potential— indoor and outdoor— all ratings

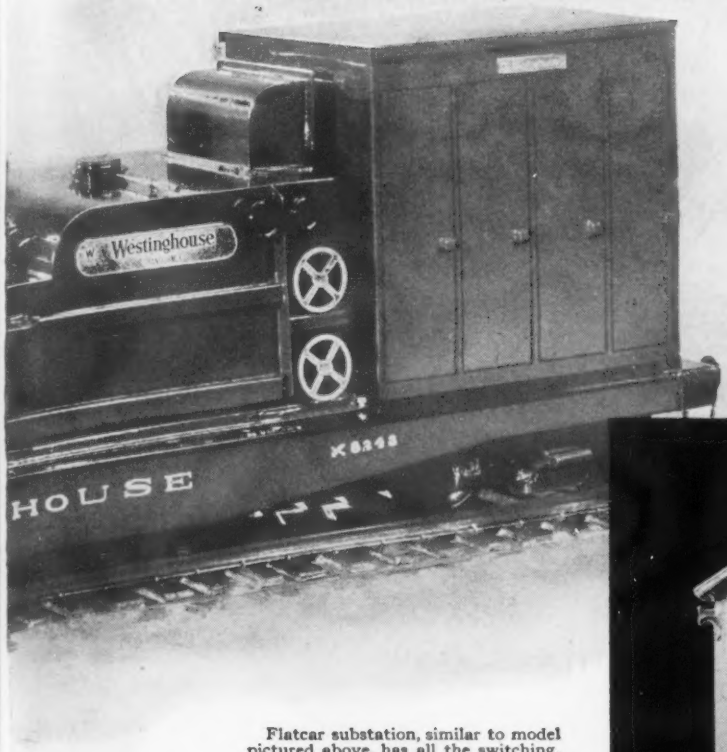


SMALL DRY-TYPE TRANSFORMERS for industrial power needs

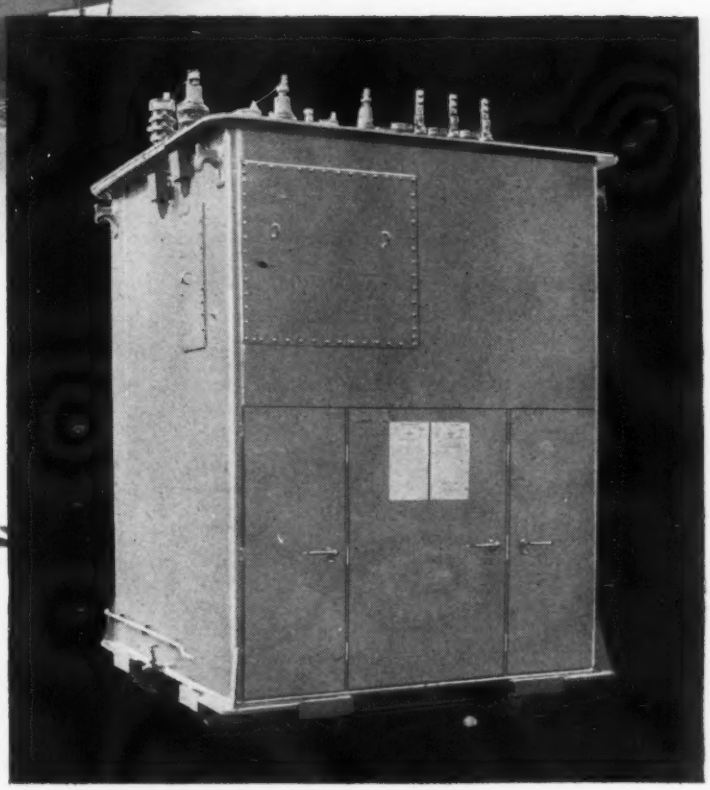
Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

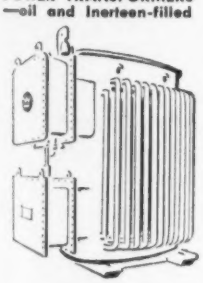
RELIGHT THE LIGHTS OF EUROPE

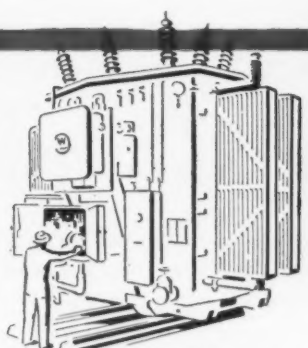


Flatcar substation, similar to model pictured above, has all the switching, transforming, distributing and protective features of a modern conventional transformer substation. It includes a forced oil-cooled, three-phase transformer of shell-form construction . . . best suited to withstand this type of service.



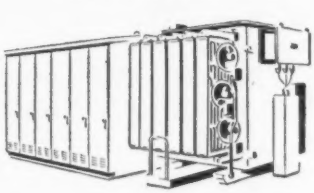
POWER TRANSFORMERS
—oil and Inerteen-filled





POWER REGULATORS
for tie-line power control

UNIT SUBSTATIONS
—time and spacesaving
"Packaged Power" units



ONE PACKAGE REPLACES 44 ITEMS

A complete single-feeder substation—in a single compact package! Westinghouse CSP Transformers combine the 44 major components of the conventional substation in one easy-to-order, easy-to-install, easy-to-move unit. They save many valuable man-hours in planning, co-ordinating and construction . . . and they're completely self-protected against lightning, overloads and short circuits.

first name in **TRANSFORMER EQUIPMENT**

Certified Ballasts and Starters are an important part of Fleur-O-Lier Certification.

For you can be sure that fixtures labelled Fleur-O-Lier are RIGHT! Right . . . for top performance. And right for trouble-free operation.

Here's why:

1. This label on a fixture means that it is built to definite *authoritative specifications* . . . to provide the best in lighting and lamp performance, together with dependable service.
2. It signifies that fixtures are subject to rigid test by Electrical Testing Laboratories, Inc., and are certified by them as meeting Fleur-O-Lier specifications.
3. It brings you the knowledge and research of many of the finest technicians in fluorescent lighting.

And in addition—this label lets you choose from a wide variety of fluorescent fixtures designed to appeal to the taste and style needs of your customers—and be sure about quality!

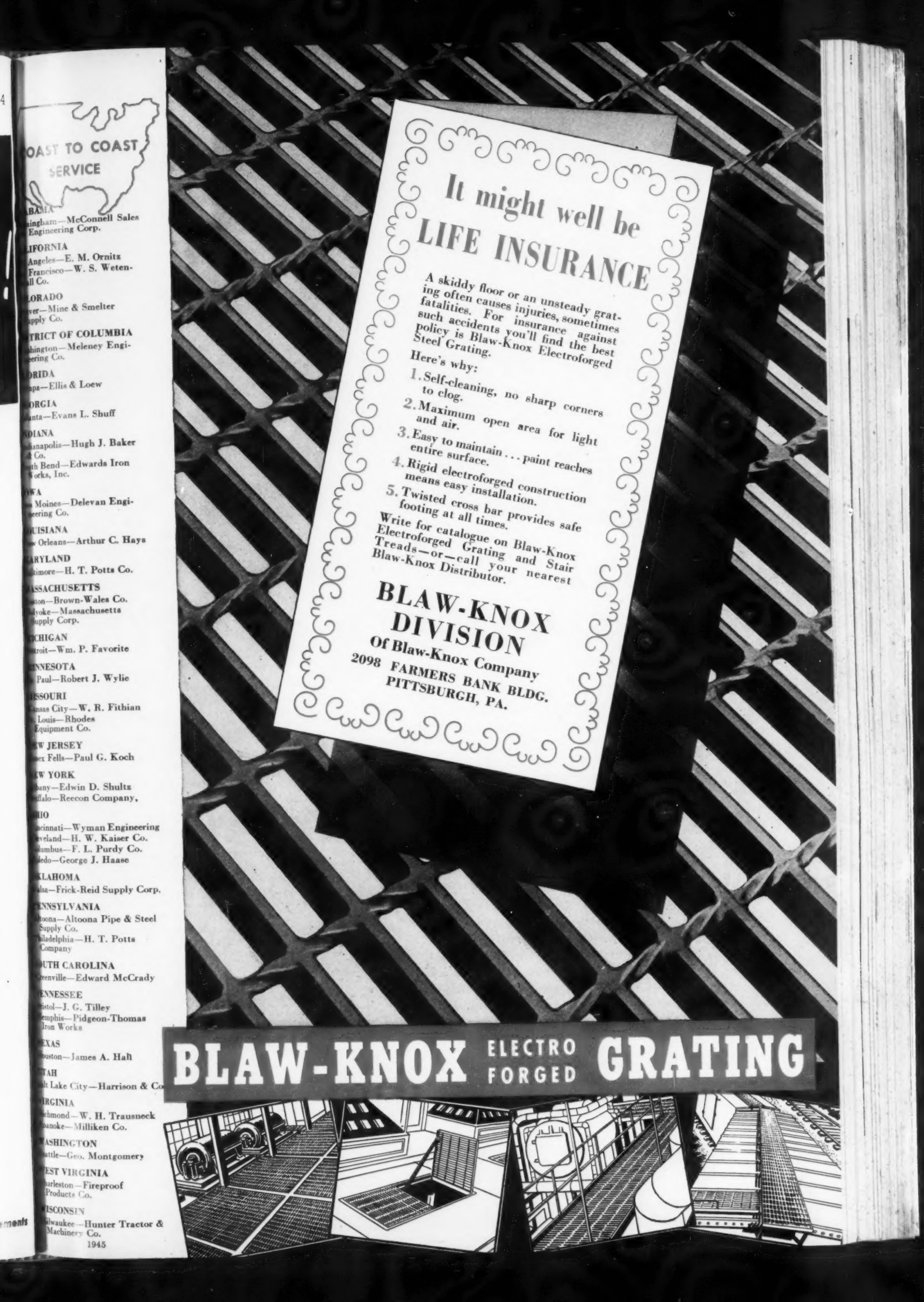
★ ★ ★

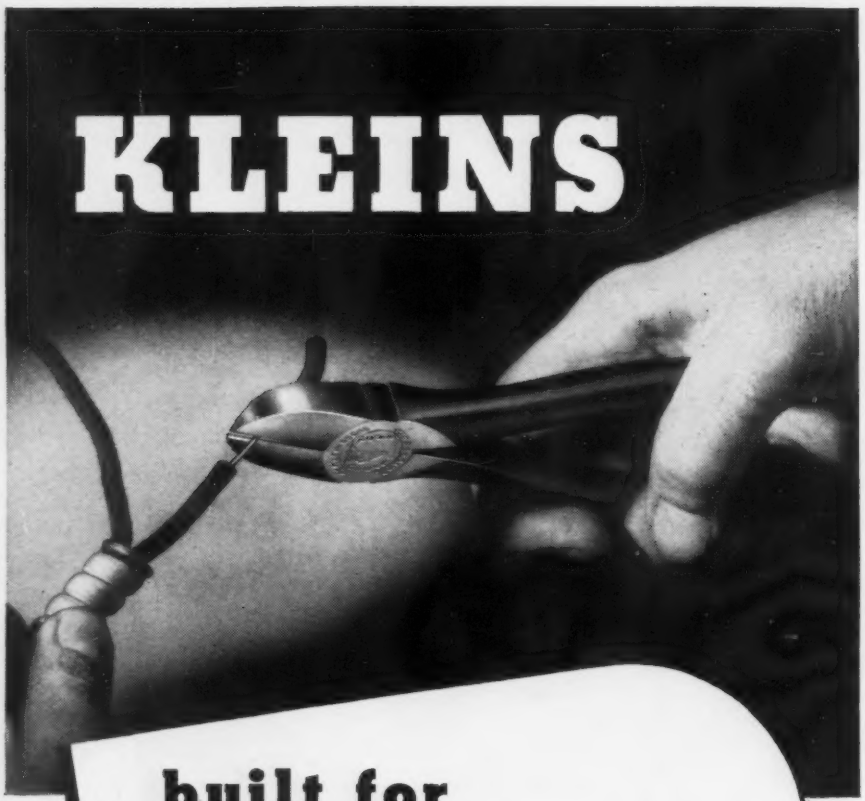
Remember over 30 leading fixture makers build Fleur-O-Liers; so when you're planning for tomorrow's fluorescent lighting, be sure fixtures marked Certified Fleur-O-Lier are part of your plans.

FLEUR·O·LIER *Manufacturers*

CERTIFIED FIXTURES FOR FLUORESCENT LIGHTING

Participation in the FLEUR-O-LIER MANUFACTURERS' program is open to any manufacturer who complies with FLEUR-O-LIER requirements


It might well be
LIFE INSURANCE
A skiddy floor or an unsteady grating often causes injuries, sometimes fatalities. For insurance against such accidents you'll find the best policy is Blaw-Knox Electroforged Steel Grating.
Here's why:
1. Self-cleaning, no sharp corners to clog.
2. Maximum open area for light and air.
3. Easy to maintain . . . paint reaches entire surface.
4. Rigid electroforged construction means easy installation.
5. Twisted cross bar provides safe footing at all times.
Write for catalogue on Blaw-Knox Electroforged Grating and Stair Treads—or—call your nearest Blaw-Knox Distributor.
BLAW-KNOX DIVISION
Of Blaw-Knox Company
2098 FARMERS BANK BLDG.
PITTSBURGH, PA.
BLAW-KNOX ELECTRO FORGED GRATING
COAST TO COAST SERVICE
ALABAMA
Birmingham—McConnell Sales & Engineering Corp.
CALIFORNIA
Los Angeles—E. M. Ornitz
San Francisco—W. S. Wetenkill Co.
COLORADO
Denver—Mine & Smelter Supply Co.
DISTRICT OF COLUMBIA
Washington—Meleney Engineering Co.
FLORIDA
Tampa—Ellis & Loew
GEORGIA
Atlanta—Evans L. Shuff
INDIANA
Indianapolis—Hugh J. Baker & Co.
South Bend—Edwards Iron Works, Inc.
IOWA
Des Moines—Delevan Engineering Co.
LOUISIANA
New Orleans—Arthur C. Hays
MARYLAND
Baltimore—H. T. Potts Co.
MASSACHUSETTS
Boston—Brown-Wales Co.
Holyoke—Massachusetts Supply Corp.
MICHIGAN
Detroit—Wm. P. Favorite
MINNESOTA
St. Paul—Robert J. Wylie
MISSOURI
Kansas City—W. R. Fithian
St. Louis—Rhodes Equipment Co.
NEW JERSEY
Essex Fells—Paul G. Koch
NEW YORK
Albany—Edwin D. Shultz
Buffalo—Reecon Company,
OHIO
Cincinnati—Wyman Engineering
Cleveland—H. W. Kaiser Co.
Columbus—F. L. Purdy Co.
Toledo—George J. Haase
OKLAHOMA
Tulsa—Frick-Reid Supply Corp.
PENNSYLVANIA
Altoona—Altoona Pipe & Steel Supply Co.
Philadelphia—H. T. Potts Company
SOUTH CAROLINA
Greenville—Edward McCrady
TENNESSEE
Bristol—J. G. Tilley
Memphis—Pidgeon-Thomas Iron Works
TEXAS
Houston—James A. Hall
UTAH
Salt Lake City—Harrison & Co
VIRGINIA
Richmond—W. H. Trausneck
Roanoke—Milliken Co.
WASHINGTON
Seattle—Geo. Montgomery
WEST VIRGINIA
Charleston—Fireproof Products Co.
WISCONSIN
Milwaukee—Hunter Tractor & Machinery Co.
1945



built for
TOUGH JOBS!

• If you ever stripped tough insulation —if you ever cut through hard wire—if you ever spliced a stranded cable—you know it's a job demanding good pliers.

Kleins were designed to do the tough jobs and every lineman and electrician knows he can rely on them in the pinches as well as in the routine day's work.

The extra quality—the extra stamina —the ability to stand up day after day, year after year, in the service of men who have no time to "baby" equipment have won Kleins their reputation.

Now that the war has ended and the vast program of expansion and modernization of power and communication lines has begun, Klein tools and equipment will play their part in getting the job done quicker—in protecting the lives of the men on the poles.

This book on the care and safe use of tools will be sent on request.

ASK YOUR SUPPLIER
Foreign Distributor: International Standard Electric Corp., New York

Since 1857

Mathias KLEIN & Sons
Established 1857 Chicago, Ill., U.S.A.
3200 BELMONT AVENUE, CHICAGO 18, ILLINOIS

Sheathed Cable (1021)

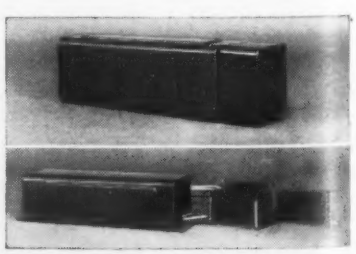
General Electric is making a new small-diameter non-metallic sheathed cable with thermo-plastic insulated T type conductors and bearing the trade-mark name PVX. This cable is made in two- and three-conductor assemblies in sizes 14 to 4 without ground wire. The thermo-plastic insulation has a smooth, hard finish requiring no additional protecting braid and, according to the announcement, this feature, together with an improved crushed-paper armor, reduces weight and diameter. It is approved by Underwriters' for 60° C operation. The cable assembly consists of the insulated conductors, a spiral-wrapped impregnated crushed-paper armor, waterproof jute fillers, a longitudinal paper wrap and a moisture resisting, flame retarding over-all braid, which has a hard, smooth finish said to be non marking and non tacking.

Insulation Tester (1022)

Weston has a direct-reading insulation tester for applications where high testing potentials are not desired. It provides a single-range for readings from 0.1 to 10,000 megohms, with the 10,000 mark at 8% of the scale length. The circuit has a test potential of less than 50 volts d-c. An electrical guard circuit is provided for elimination of surface leakages when testing cables, it is stated. Model 799 is 5⅜x3¼x4⅞ in. Exposed metal parts are insulated. A "press-to read" switch automatically disconnects battery circuit when not in use.

Junction Box (1023)

Jefferson Electric has developed a junction box to fit its cold cathode ballasts and which can be attached with the bolts used for mounting the standard ballast. Shown separately and attached, the box is made in two pieces: One designed to slide over guides on one end of the ballast case and the other to form the cover which is secured by one screw.



Infrared Units (1024)

Carbomatic Corp. is offering two portable infrared units for use with reflector type lamps. Model W6 is designed for six lamps and model R12 for twelve. Reflector type lamps in any size, may be used, according to the announcement.

PRODUCTION "FROZEN"

...without Adequate Plant Wiring

Urgent boosts in production are more than a matter of manpower, machines and plant floor space. They demand an electrical system that's not "frozen" by outmoded standards . . . that's expandable to meet output increases without costly ripping-out for re-wiring operations.

Adequate plant wiring simply means thoroughness — insistence on ample copper, in wires and cables . . . generous provision of outlets . . . foresighted use of economical high voltage cables and unit sub-stations at load centers.

Foresight pays in wire and cable selection, too. Specify Okolite-Okoprene* wire, for example, in the distribution of power to equipment and benefit by its good performance. It's good because of the excellent electrical properties of Okolite oil-base insulation. It's good because of an outer protective jacket of non-flammable Okoprene which resists moisture and oil as well as abrasion and corrosion. Incidentally Okoprene Sheaths have proved effective for many other uses than power and light wiring, for example: battery cables, control circuits, communication wiring. They also serve as protective covering for Okocord Portable Cords, including welding cables.

Feel free to talk over adequate wiring problems with Okonite engineers — to discuss cable selection, too, with them. The Okonite Company, Passaic, N. J.

*U. S. Pat. No. 2,312,058

OKONITE

insulated wires and cables

4117

For easier Sales and lasting Customer Satisfaction ..CERTIFIED BALLASTS

It's a fact! Your fixtures will have extra sales appeal for your customers . . . *when you use Certified Ballasts.*

And good reason for this preference too, because:

1. **Certified Ballasts are built** to definite specifications . . . to assure better lamp performance. *Leading fluorescent tube makers recognize this*—since with Certified Ballasts in a fixture, they will guarantee lamp performance.
2. **Certified Ballasts are subject** to thorough testing by Electrical Testing Laboratories, Inc., and Certified by them as meeting the specifications.
3. **Certified Ballasts help assure** top fixture performance and dependable service . . . *as your customers know.*

Good reasons why you'll want this extra value and sales power . . . this assurance of continuing customer satisfaction for *your* fixtures!

And remember this: Certified Ballasts will be available as soon as any . . . when materials are freely available. So why not take advantage of the prestige and dependability that Certified Ballasts add to any fixture?

Certified Ballast *Manufacturers*

MAKERS OF BALLASTS FOR CERTIFIED FLUORESCENT LIGHTING FIXTURES

CHICAGO TRANSFORMER CORP.
3501 Addison St., Chicago, Illinois

DONGAN ELECTRIC MFG. CO.
2987-3001 Franklin St., Detroit, Mich.

GENERAL ELECTRIC CO.
Specialty Transformer Section
1635 Broadway, Fort Wayne, Ind.

JEFFERSON ELECTRIC CO.
Bellwood, Illinois

SOLA ELECTRIC CO.
2525 Clybourn Ave., Chicago 14, Illinois

WHEELER INSULATED WIRE CO.
378 Washington Ave.,
Bridgeport, Conn.

IT'S PACKED WITH FACTS

THAT EVERY TRANSFORMER USER WILL WANT TO KNOW

Packed between the covers of the new Kuhlman Catalog No. 457 are detailed descriptions of the design and construction advantages that have made Kuhlman Distribution Transformers the choice of an ever-increasing number of engineers. This catalog gives you the complete picture—verbally and pictorially—of the exclusive Kuhlman Bent Iron core construction which increases the transformer's usefulness and operating economy. Insulation, cores and core frames, taps, terminal boards and tap changers, and tanks and tank finishes are treated at length to give you at your finger-tips the information you seek when you consider the purchase of distribution transformers. Write for your free copy of this useful catalog today.

KUHLMAN ELECTRIC COMPANY • BAY CITY, MICHIGAN *Kuhlman*

Cole Electric Co.

1510 South Los Angeles Street
PRospect 2068
LOS ANGELES 15, CALIFORNIA

•

POWER PLANT EQUIPMENT

AIR BREAK SWITCHES
MANUALLY OPERATED

AIR BREAK SWITCHES
MOTOR OPERATED

DISCONNECTING SWITCHES

BUS AND CABLE FITTINGS

BUS AND CABLE SUPPORTS

FUSE MOUNTINGS

FUSES

SWITCHBOARDS

INDUCTION RELAYS

MARINE EQUIPMENT

SWITCHBOARDS

ELECTRICAL EQUIPMENT RELAYS

AIRPLANE EQUIPMENT

BOMB RACKS

SWITCH HOUSINGS

THROTTLE SWITCHES

LIMIT SWITCHES

OIL FILLED SWITCH HOUSINGS

SWITCHBOARDS

RELAYS

•

Pacific Coast Representatives

EICHER & BRATT
Colman Bldg., Seattle 4, Washington • • Eliot 2722

EARL S. CONDON COMPANY
357 S. Hill St., Los Angeles 13, Calif. • • MI. 2831

Mousing Tool (1025)

Copperweld Steel Co. has developed a mousing tool for a new type of dead-end. According to the announcement, this tool with a coil of annealed wire, enables the lineman to place about 50 closely wrapped turns around the free end of the strand and the main strand, binding them securely. It is stated that this type of dead-end will develop the full rated strength of the strand and is applicable for attaching the strand to the guy fittings. The tool is said to be similar to the Copperweld serving tool, except for a slight difference in the forming of the tines at the ends and the addition of two small J hooks for maintaining tension on the mousing wire.

Starter (1026)

G-E has added a "Watch Dog" starter for 15- and 20-watt fluorescent lamps, which it claims is particularly suitable for commercial and residential fixtures. Similar to the existing line for 30-, 40- and 100-watt lamps, the new starter has an average rated life of three years under specified test conditions. Features announced are precision lamp starting and dead lamp lockout. When a dead lamp is removed, the starter is reset by pressing a button on its top.

Reflector (1027)

General Detroit Corp. and General Pacific Corp. are offering a light reflector which is claimed to eliminate "dark spots" by means of a reflecting surface broken into multiple diamond shapes. It is made for use with flashlights, searchlights, lanterns, spotlights and floodlights of all sizes and types. A special flashlight called Floodbeam incorporating the new reffector is being marketed by the two companies.

Radio (1028)

Ansley Radio Corp. has announced a radio for built-in installations. Known as the Ansley Paneltone, it is built on a steel panel and requires 4½ in. depth. Two models are offered, a seven-tube set on a 14x14-in. panel in either a-c or a-c, d-c and a 17-tube model giving both FM and regular broadcast reception and with 14x26-in. panel.

Mechanical Joint Lamps (1029)

North American Electric Lamp Co. is supplying its carbon filament lamps with a mechanical joint between the base and bulb, eliminating need for cements or other binders. The clear type is furnished with this base in 128, 250, 375 and 500 watts; inside silvered R-40 lamps in 128, 250 and 375 watts.

FOR SAFETY'S SAKE . . . USE CONDUIT *(Full Weight Rigid Steel)*

FOR satisfactory performance of duty under all conditions of service... even the most critical will approve this citation of rigid steel conduit.

Neat and orderly appearing! And for strength and endurance, rating is the highest. Dependability in emergencies, 100%.

When Youngstown Buckeye Conduit is "back from the war," you can again employ this veteran protector wherever you need to give your wiring jobs unfailing, enduring protection.

BUCKEYE TRADE MARK YOUNGSTOWN CONDUIT

Ask your distributor for: Youngstown Buckeye Conduit . . . Pipe and Tubular Products . . . Sh . . . Plates . . . Electrolytic Tin Plate . . . Bars . . . Rods . . . Wire . . . Nails . . . Tie Plates and Spikes

YOUNGSTOWN

THE YOUNGSTOWN SHEET AND TUBE COMPANY

YOUNGSTOWN, OHIO

Manufacturers of

CARBON - ALLOY AND YOLOY STEELS

©1945 Westinghouse Electric Corporation

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

MAZDA LAMPS | FOR SEE-ABILITY

just this

TAKE THESE LAMPS—fluorescent lamps by Westinghouse. What is there about them that makes them so bright, so long lasting? Westinghouse research . . . electrical "know-how" . . . precision manufacturing experience.

HOLD A FLUORESCENT lamp in your hand—this Westinghouse fluorescent—and it may seem about the same as any other fluorescent. But just put it in a fixture. Then, when you've seen it glowing uniformly bright from end to end . . . when you think of the thousands of satisfied Westinghouse fluorescent users, many of them *your* good customers . . . *that's* what you can count on in a lamp that says "Westinghouse". That's when you're happy to be selling *Westinghouse Lamps.*

WESTINGHOUSE PRESENTS *John Charles Thomas, Sunday 2:30 P. M., E. W. T., N. B. C.*
Tune in Ted Malone, Monday through Friday 11:15 A. M., E. W. T., Blue Network.

WESTINGHOUSE ELECTRIC CORPORATION LAMP DIVISION, • BLOOMFIELD, N. J.

A New
ALL STEEL
SCREW ANCHOR
that's easier to
install
Here is the latest improvement in the all steel screw anchor—a drop forged steel tripleye rod, *double arc welded to a forged steel blade. The method by which this anchor is produced makes it possible to control the pitch of the blade to give the easiest possible installation and greatest holding power. The pitch is not limited by the manufacturing process.
The steel blade is tapered to the outer edge and sharpened to reduce friction and make installation easier. The small hub minimizes earth disturbance and thus aids installation and improves holding power.
GREATER
HOLDING POWER
This new steel screw anchor has been given "the works" in field and laboratory tests. It has topped our most optimistic expectations. Under ideal conditions, this anchor—in all sizes—has been tested to pull several times its rated holding power. We attribute its great strength to the fact that both anchor and rod are forged steel, *double welded together, with the blade being correctly pitched and tapered for minimum earth disturbance and the hub small to allow a greater holding surface. Chance Steel Screw Anchors are made in 4, 6, 8 and 10 inch sizes and are recommended for installation in sandy soils.
*Blade is welded to rod on both top and bottom sides with shielded arc electric weld.
A·B·CHANCE CO.
CENTRALIA, MISSOURI.

BULLETINS

data books, etc.

Aluminum Connectors (1030)

Thomas & Betts has a bulletin describing late developments in aluminum connectors for aluminum cable. This 30-page booklet gives technical and installation data on straight and angle aluminum lugs and suggested designs for unusual and original postwar requirements. It explains the T&B basic hexagonal design feature of the line. Laboratory testing results are given and photographs show standard and tailor-made installations.

Floor Resurfacer (1031)

Tufcrete Co. has issued a six-page folder describing its resurfacer for worn floors of wood, concrete, brick, asphalt and stone. This resurfacer is for use indoors or out and for patching or a complete new surface. Its applications also include sidewalks, steps, expansion joints, platforms, columns and beams, etc. It is an asphaltic-base liquid, which is added to a concrete mixture.

Price Sheet (1032)

Reliable Electric Co. has issued a 32-page price sheet, listing its complete line. Superseding all previous price sheets, this one contains prices and descriptions of connectors and construction specialties for power companies, and communication protective and terminal equipment for telephone companies.

Maintenance Equipment (1033)

Ideal Commutator Dresser Co. is offering a booklet on its maintenance and repair equipment for motors and generators. This 36-page illustrated booklet describes the equipment, tells when and how to use it. A section on commutator care is included.

Catalogue Sheets (1034)

Ohio Brass Co. has issued new catalogue sheets for its mining and industrial catalogue No. 22. The new sheets refer to products designed for dead-ending and supporting trolley wire and feeder cable in crane and industrial work; tap and fuse listings; attachment clamps.

Merchandising Catalogue (1035)

Cutler-Hammer is offering a new merchandising catalogue of its full line of safety switches, service control, multi-breakers and electrical specialties. Also included is a selected list of motor control items. This catalogue is illustrated and provides technical data.

Motors (1036)

Electrical Engineering & Mfg. Corp. is distributing an illustrated brochure containing the history of its company and listing its specially designed motors for industrial and military applications. Also included are product photographs, drawings and technical data.

Silicones (1037)

Dow Corning has prepared a 12-page bulletin listing its available silicone products and containing charts and graphs demonstrating properties of these organo-silicon-oxide polymers. Silicone forms described include fluids, greases and compounds, resins and varnishes and rubber.

Plastics (1038)

American Cynamid Co. has prepared a 24-page booklet describing the applications of Melamine plastics in industry. This booklet is designed for popular appeal and to supplement technical publications on the subject.

Office Lighting (1039)

"Wall-to-Wall Lighting for Tomorrow's Office" is the title of a recent bulletin in General Electric's series of architectural lighting design booklets.

Lubricating System (1040)

Farval Corp. tells advantages of a centralized lubricating system for machine equipment in an illustrated four-page folder entitled "When You Reconvert."

Battery Chargers (1041)

Electric Products Co. has issued bulletins on its new battery chargers for motorized hand-lift industrial trucks.

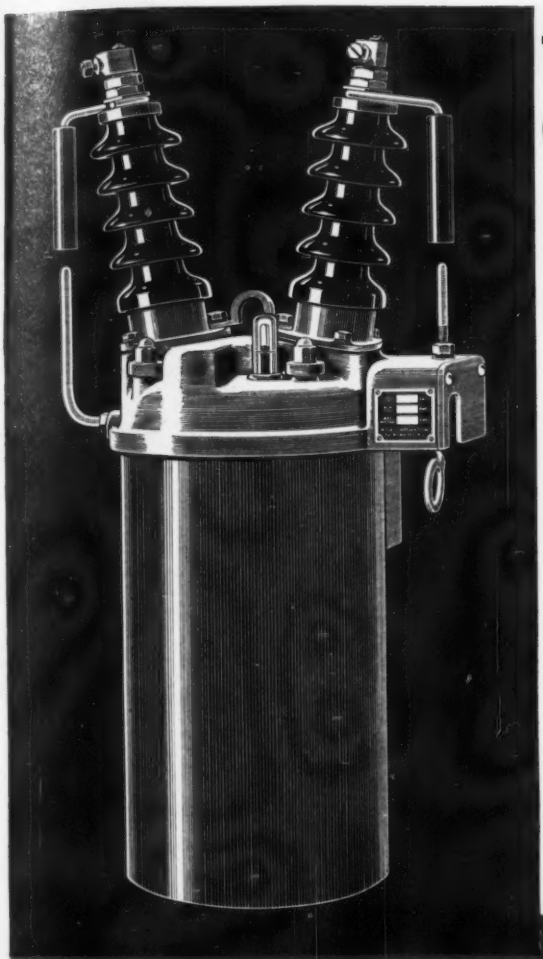
ELECTRICAL WEST, 68 Post St., San Francisco, 4, California
Please send me information about following CIRCLED items:

1000	1001	1002	1003	1004	1005	1006	1007	1008	1009
1010	1011	1012	1013	1014	1015	1016	1017	1018	1019
1020	1021	1022	1023	1024	1025	1026	1027	1028	1029
1030	1031	1032	1033	1034	1035	1036	1037	1038	1039
1040	1041								

Name..... Company*..... Title*.....

Address.....

* Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.



This is the way KYLE Automatic Oil Circuit Reclosers Operate

- To Decrease Outages
- To Reduce Maintenance
- To Increase Continuity of Service

Rural distribution systems with their long lines and small loads scattered over large areas depend, for their economical operation, on low cost of installation, minimum cost of maintenance, and maximum continuity of service.

Kyle Automatic Oil Circuit Reclosers provide the perfect protection for such lines. This Recloser has the advantages of minimum time delay opening on the first and second operations to clear all transient faults on the protected sector. It also gives greater time delay opening on the third and fourth operations to allow the blowing of a sectionalizing or transformer fuse to isolate a permanent fault without locking out the Recloser.

Thus, the Kyle Recloser permits the clearing of 85% of all faults which occur on rural systems and restores service completely as soon as they are cleared. It isolates the permanent faults to the smallest possible localities.

This ability of Kyle Automatic Oil Circuit Reclosers to coordinate with fuse links greatly decreases the number of outages, eliminates countless service trips, reduces maintenance costs and provides the greatest possible continuity of service.

TIME CURRENT VALUES OF KYLE RECLOSER OPERATION

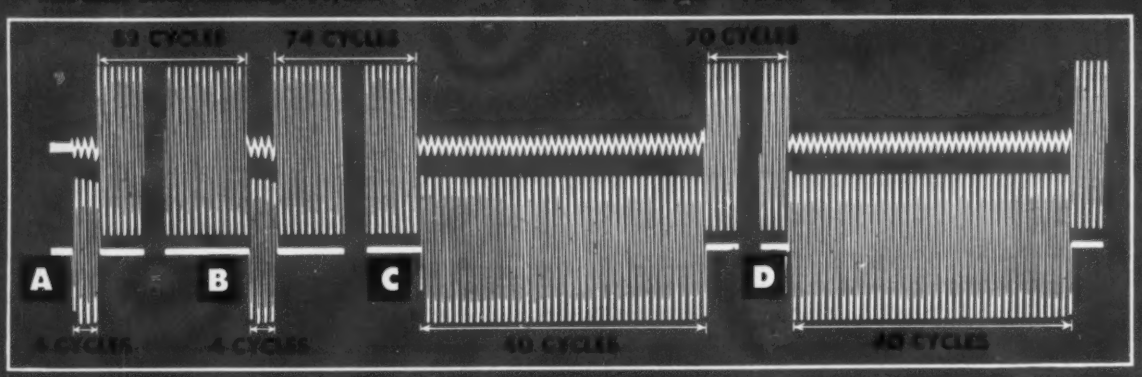
This oscillogram gives a graphic picture of the time current values obtained in a single interruption of a 5 Ampere Type "H" Kyle Automatic Oil Circuit Recloser taken at 2400 volts with a current of slightly over 20 amperes and a power factor of 82.5.

A FIRST OPENING: Time required to open: 4 cycles; time delay before reclosing: 82 cycles.

B SECOND OPENING: Time required to open: 4 cycles; time delay before reclosing: 74 cycles.

C THIRD OPENING: Time required to open: 40 cycles; time delay before reclosing: 70 cycles.

D FOURTH OPENING: Time required to open: 40 cycles. Recloser locks out.



Ask your Line Material Representative to give you full information on the specific application of Kyle Automatic Oil Circuit Reclosers to your lines.

MADE BY KYLE CORPORATION SOUTH MILWAUKEE WISCONSIN

KYLE Circuit Reclosers are Designed and Manufactured for LINE MATERIAL COMPANY MILWAUKEE WISCONSIN

Easy to get at

G-E 2-WAY FM RADIO

- Complete Accessibility
- Greater Communication Range
- Lower Battery Drain
- Improved Tuning Reliability

Every circuit component, every connector and wire is within free and easy reach.

Every tuning control, every tube is completely accessible.

Complete accessibility of G-E 2-way FM radio sets a new high in equipment maintenance.

Here are the reasons.

- Every component and cable is easy to get at.
- Maintenance work requires no special tools.
- Each chassis can be inverted on its own sturdy workbench support for under-chassis inspection and servicing.
- Workbench support is removable for top-chassis inspection, circuit alignment, and tube replacement.
- All sockets and alignment controls are clearly identified.
- Chassis can be removed from permanently installed base plates simply by loosening two screws.
- Multiple test jacks on each chassis provide for direct and simultaneous circuit metering.
- All interconnections are quickly made with detachable plug connectors.

For additional information on G-E 2-way FM radio equipment or for help concerning your particular communication problem, see your G-E representative or write *Electronics Department, General Electric, Schenectady 5, N. Y.*

Hear the G-E radio programs: *"The World Today" news, Monday through Friday 6:45 p. m. EWT, CBS. "The G-E All-Girl Orchestra," Sunday 10 p. m., EWT, NBC. "The G-E House Party," Monday through Friday, 4 p. m., EWT, CBS.*

Everything for a 2-way radio

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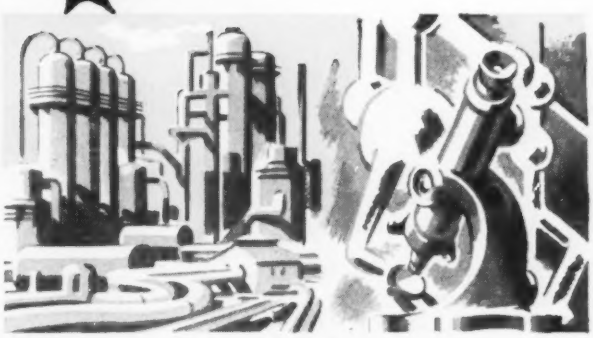
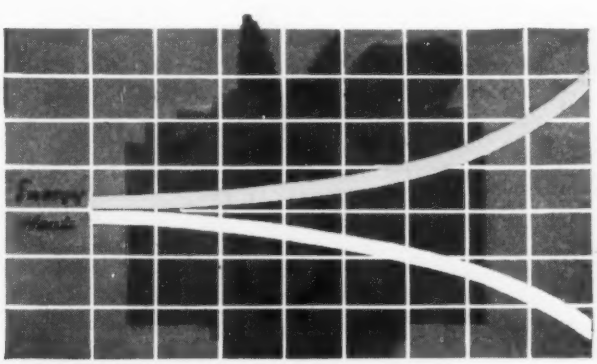


2. It is only by the most careful refining and handling that moisture is sufficiently excluded from oil to prevent excessive deterioration in insulating qualities.

3. This freedom from moisture and other foreign substances is measured by the dielectric strength of the oil. Red Line Transformer Oil in containers has a dielectric strength, on delivery, of 27,500 volts minimum.



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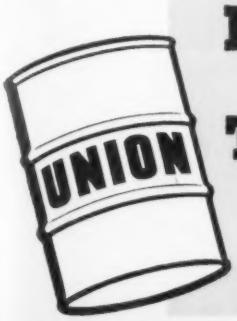

RED LINE

TRANSFORMER OIL

UNION 76

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ELECTRA'S HUSBAND

Prophets in the Industry

"WHAT have you brought home now?" Electra asked one night shortly after V-J Day when I happened to shake a hundred or so letters out of a big envelope onto the ottoman in front of my favorite chair.

"These? Why I guess you might call them a contest or something," I answered. "Way back in early 1942 I had a brainstorm. . . ."

"That's not unusual," Electra mused.

". . . and asked a couple of hundred friends to give their best estimate as to when the war would end," I continued, ignoring her interruption. "A lot of them said that trying to answer a question like that came under the heading of complete imbecility, but even so they gave their guesses. It was the American gambling instinct, I suppose."

"You mean the fat-headed belief that, like you, they could give the answer to any question," Electra cut in. "You men like to make out that you are oracles, when most of the time you are second guessing."

"I thought all oracles were women," I said and continued before she could come back with a fighting rejoinder. "Anyway, now that the war is over I thought I would see who the real prophets in the group were. Most everyone was too optimistic. Seventy-five per cent of them were certain the war would be over before the end of 1944, in fact almost half said that we would win in 1943."

"That's what you thought, if I remember correctly," Electra said.

"No, I was close to the average of the whole group," I commented. "The summer of 1944 was my date. I have it right here along with the others. But the interesting thing is that one fellow gave the right month and year and two others were close enough to be included with him.

"Now my curiosity is aroused," Electra said. "Who was right, unless it's none of my business?"

"Well Kelly Courtright of Fresno hit it right on the nose, if you must know," I answered. "He said August 1945 and he gave a good reason for his guess. 'By the end of 1944 this country should be properly geared for a real war with a large, well-manned army, properly equipped to meet any opposition, together with a two-ocean navy that should force our enemies to surrender,' was the way he put it."

"A perfect guess and good logic to back it up," Electra said. "Who were the others?"

"The next closest was the late Al C. Joy of PG and E, and I only wish that he were alive to enjoy some of the fruits of American victory," I said. "Al could be just as deep and profound as he could be funny when he wanted. But let me read you his letter—remember this was written in May 1942:

" 'If military and economic experts, and even those infallible pundits, the radio commentators, cannot or will not hazard a guess, what value can be put upon the opinion of the common citizen who knows nothing except what he reads in the papers—and therefore knows nothing? Nevertheless, I'll be one of the fools to rush in, if only to help out your poll and maybe make certain this opportunity for a national laugh will not die on the vine.

" 'The present world-wide war will end about September 1945.

" 'It is my opinion that Hitler will succumb before that time. He will have the aid of France next year, but the French people will not have their hearts in the fight, they haven't much to fight with and they will be ready to quit in 1944. Italy may quit sooner. Hitler will make his last great campaign in 1944, and it will be his finish.

" 'But the United Nations will get stronger. None of us knows what strategy is planned, but each of us is confident our military leaders know what they are doing. Eventually they will compel Japan to shorten up her lines. We'll drive Japan back to her own islands within two years. Japan will be able to hold out there for another year, but the strength of allied assaults in the summer of '45 and the condition of her people will mean surrender about the time summer ends.

" 'Japan's people haven't any morale, chiefly because they don't know what the word means. They've got to take whatever they're told to take. But living conditions there are very bad now; they will get worse. And history will repeat itself—no leadership, no matter how determined, has ever been able to hold out against a starving people, or to keep people fighting when all possibility of victory has vanished.' "

"If the letter had mentioned one clue to the atomic bomb, I would have said he was the seventh son of a seventh son," Electra commented. "But you said there were three."

"Yes," I continued, "there were. The last one is Roy Grettum from up in Baker, Oregon. He guessed June 1945, and he reasoned this way, 'Germany is a great nation and has the resources of an enormous area under her control. She is absolutely ruthless and very efficient in the use of any implement of war. I do not think she can be defeated until a victorious invading army has driven across the heart of Germany. The particular problems involved in the maintenance of that victorious army are so great that I think we will have done a good job if the fighting is conclusive in 1944, and the remnants have been wiped up early in the following year.' "

"At the time he wrote, he didn't give the Russians much thought," Electra mused. "Now if he had said two armies, he would have hit the nail right on the head. All three of those were first-class guesses. How about the rest?"

"Forget them," I said. "Even the fellows who wrote wouldn't appreciate knowing how far they missed."

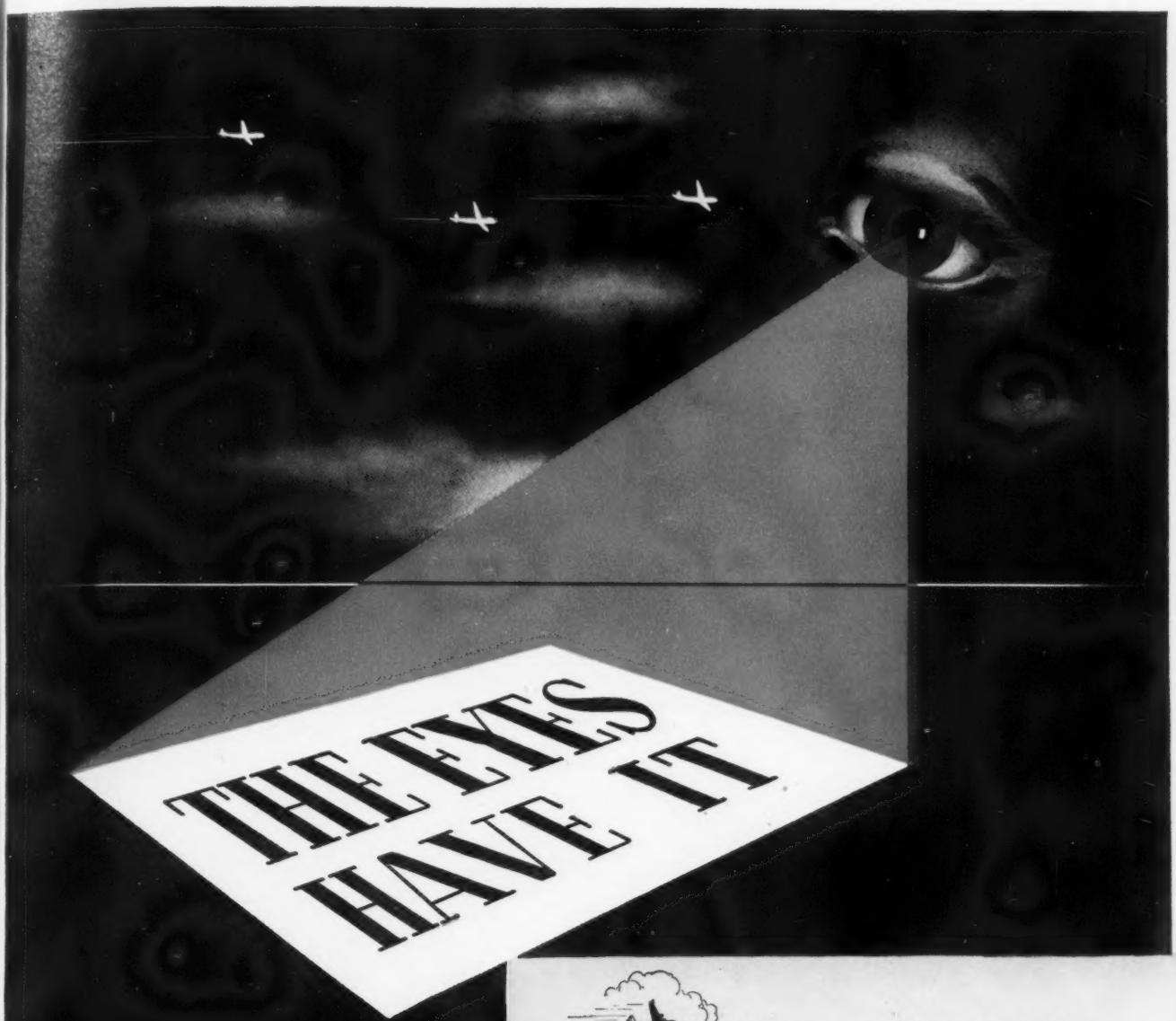
ELECTRA floors me every now and then with the knowledge she picks up from the radio. She contends that we males don't stay home enough to really know what goes out over the air to the housewives of the nation.

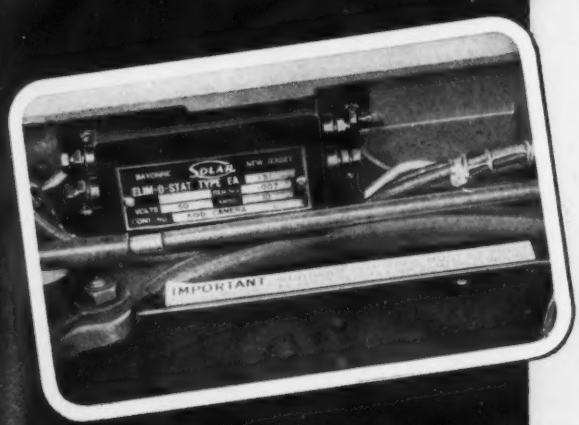
As nearly as she could remember it, here is the gist of one choice item:

"The United States Treasury is finding that collecting taxes from Americans is like calling someone a bad name—it's possible to get away with it, but the rule is, brother, when you say that, smile!

"Yet, in recent years the Bureau of Internal Revenue has hired its full share of scowling, evil-tempered, vinegar-puss grouches . . . The matter was brought to a head recently by the National Association of Manufacturers.

"This group has indicated that there's no earthly reason why the treasury's tax-collection agents have to be nasty and officious and act as if it's more patriotic to collect taxes than to pay them. As a result, the treasury may issue a general order to all agents warning them to keep smiling hereafter and to treat taxpayers with respect."





Quick as a wink the Fairchild Night Owl Camera records enemy movements intended to be hidden by darkness. Quick as a flash the radio of the photo-reconnaissance plane keeps touch with its base — and clearly — for Solar Elim-O-Stats are part of the electronic equipment of these highly perfected cameras.

This is but one of many instances where Solar Elim-O-Stats are being used to absorb local interference and keep speech channels free. Let Solar advise you on radio-noise suppression.

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Free Discharge Valves

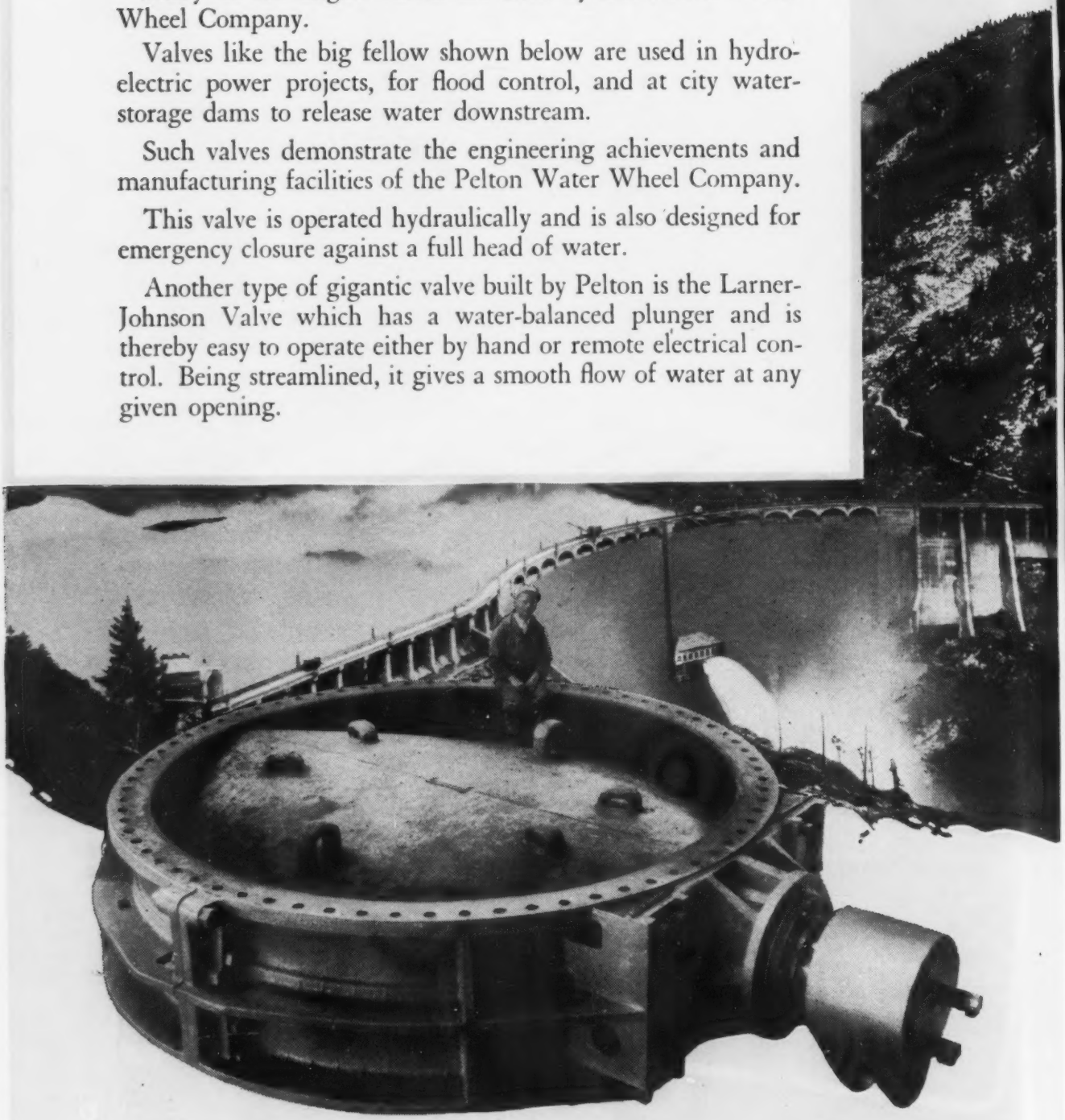
Many of the largest valves are built by the Pelton Water Wheel Company.

Valves like the big fellow shown below are used in hydro-electric power projects, for flood control, and at city water-storage dams to release water downstream.

Such valves demonstrate the engineering achievements and manufacturing facilities of the Pelton Water Wheel Company.

This valve is operated hydraulically and is also designed for emergency closure against a full head of water.

Another type of gigantic valve built by Pelton is the Larner-Johnson Valve which has a water-balanced plunger and is thereby easy to operate either by hand or remote electrical control. Being streamlined, it gives a smooth flow of water at any given opening.



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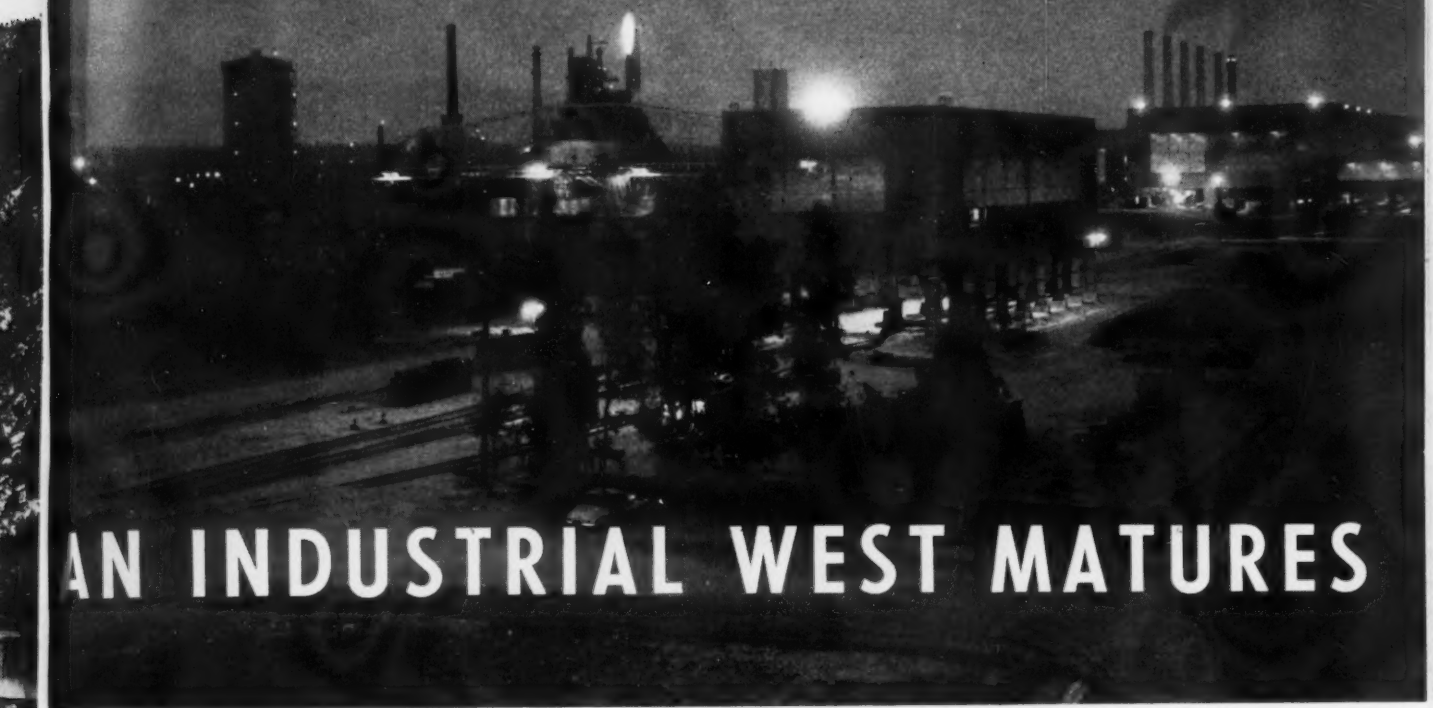
ELECTRICAL WEST

OCTOBER 1945
VOL. 95 NO. 4



AN INDUSTRIAL WEST MATURES

The Kaiser Fontana Plant

HOW well can the Far West accept the responsibilities and opportunities of the industrial maturity forced on the region by the war? For the Pacific Coast states, like the immature and callow youth who casually dons his first military uniform, has been tested and hardened by war, just as the millions of American boys have suddenly become mature under the hardships and emergencies of the battlefield.

To the confoundment of its critics and the exultation of its advocates, the West has shown a remarkable ability to absorb the potential shocks of postwar reconversion since V-J Day. The anticipated dislocations to the wartime industrial economy—the cutbacks and the closings — have been taken in stride. Even the basic problem of assimilating the war-swollen population now appears to be far less worrisome than originally anticipated.

However, there are certain fundamental considerations that have a decided bearing on the Far West's present industrial maturity and future stability: (1) The region's prewar industries had a far simpler reconversion problem than most industrialized areas; the majority of them have been fabricating exactly the same thing during the war as they made before. (2) Although the ultimate disposition of the West's $2¼ billion RFC and DPC financed industrial facilities is not yet clarified, they will have served their purpose in developing the region's industrial stature even if they should be padlocked (which is not likely). (3) Huge cutbacks in the region's two largest war industries—ships and aircraft—have not brought any startling show of unemployment or eased worker requirements in the service industries (while unemployment insurance applications totaled 221,000 for the first five weeks after V-J Day, unfilled job openings were 84,000). (4) Such basic Pacific Coast industries as agriculture, lumbering, food processing, petroleum, mining, wood pulp, electric power and others have better outlooks now than they had prewar. (5) Finally the raw material resources, the expanded population and the prospects for increased foreign trade with the countries bordering the Pacific are stimulating expansion of existing industrial facilities and are attracting new ones.

Not until the present has the West possessed all of the factors which insure an integrated industrial economy. New will be the ability to produce iron and steel economically in large quantities in the face of competition from other regions. New also is the huge capacity to produce light metals to supplement the native metallic resources. New is the national trend toward industrial decentralization. New is the pool of war-trained skilled workers. New are the population gains and potential foreign markets which warrant mass production techniques.

Perhaps no industry has a greater stake in the West's industrial future than has the electrical industry. The power from its generators motivates the machines and gives the worker his productive capacity. The electrical industry produces and installs many of the machines themselves. Its goods and services light, test, refine, count, coat, temper, move and measure the products of industry. For those reasons the searching industrial reviews in the pages which follow, together with the discussions of specific industrial installations warrant study. They point to an imposing electrical future.

Pulp division of Weyerhaeuser Timber Co., one of several large industrial plants at thriving Longview, Wash.

Northwest Outlook

Partial retention of war-borne industries expected but lumber, pulp and paper, furniture and agriculture, basic to region, are cornerstones for postwar prosperity. Aluminum looks good

David B. Simpson

Treasurer, Pacific Northwest Development Assn.

NEW shipbuilding and electrochemical projects built in the Pacific Northwest during the war have opened the eyes of many industrialists to the unlimited opportunities and potentialities of this region. Although war-borne industries have been written off in varying degree in connection with postwar planning, nevertheless, some are expected to play an important role in the industrial future of the Northwest. To aid you gentlemen of the electrical industry in more adequately appraising your future market possibilities in this area, it will be necessary to do a chamber of commerce type of piece, because the industrial future of the Northwest is also its electrical future.

By way of background, it is interesting to note that the value of products produced by the industries in the five Pacific Northwest states, according to the 1939 Census of Manufactures (last one taken), was $1,289,807,521, or 2.3% of the U. S. total. The total cumulative value of war supply contracts placed in War Production Board Region 13, Oregon, Washington and part of Idaho, through May 1945 reach $6,318,525,000, or roughly five times the industrial production of the whole Pacific Northwest in 1939. In addition the government has invested almost a billion dollars in new manufacturing, shipbuilding and military establishments in this territory. Undoubtedly these factories, shipyards and other facilities will play an important part in the postwar development of this area.

Potentialities

Just what are some of our potentialities? In 1944 the total cash income from agricultural pursuits, farming, horticulture, livestock, etc., for the three states of Oregon, Idaho and Washington, was $1,107,466,000, or, roughly, three times the income from agriculture in 1939. One-ninth of the nation's wheat is grown in these three states; one-seventh of the potatoes; one-fourth of the cherries and apples and one-third of the pears. These three states also produce 70% of the nation's hops and 90% of the dry pea crop.

In the two states of Oregon and Washington, 115,442,000 lb. of frozen fruits and berries were processed in 1944. In addition, 83,249,000 lb. of vegetables were quick-frozen in these two states in this same year. Almost 20,000,000 cases of canned fruits and vegetables were packed.

This is just the beginning. Persons familiar with the agricultural potentialities of the Pacific Northwest feel that there is going to be a tremendous expansion in the processing and quick-freezing of additional berries, fruits and vegetables. Climate is ideal for the further cultivation of these crops. The market is already developed and, as soon as the manpower is available, production will then come as a matter of course.

The irrigation projects already on paper will add new productive areas. One million acres in the Columbia Basin project alone will receive water from the Grand Coulee Dam. Various contemplated projects will supply water to the additional acres in the Willamette Valley in Oregon and other parts of the Northwest. Those added acres will provide homesteads and available farms for returning service men and indirectly increase the population of the Pacific Northwest. It is not inconceivable that the five Pacific Northwestern states will have a population of around 5,000,000 people by the early 1950's.

The fishing industry along the Coast is on the increase. In 1944, 911,023 cases of canned fish were processed in Oregon and Washington. Of these, 761,379 cases were of tuna. Tuna has supplanted salmon as the leading fish taken from Northern coastal waters. Expansion of the frozen fish industry has been phenomenal. A total of 27,695,609 lb. of frozen fish was sent to market by Pacific Northwest fishermen. The expansion of "bottom-fishing" and the production of vitamin products from fish livers and other inedible parts of the fish is a lusty and growing industry. Several fishing fleet operators of the Northwest are considering the purchase of floating process plants, completely equipped ships that will enable them to cruise the high seas, process and quick-freeze their catch immediately, so they will not have to wait until they get back to their home port before preparing their catch.

Industrial Outlook

The field of outright industry also shows a bright picture. Forty per cent of the aluminum reduction capacity of the nation is located in the Northwest. During the last year probably more than 50% of the aluminum produced in the United States was produced in this part of the country. In addition to the private investment in this industry, the federal government has, roughly, $84,000,000 invested in this field of endeavor in the Pacific Northwest.

There is no doubt that the Aluminum Co. of America will operate its wholly owned plant at Vancouver, Wash. If extensive experiments this company is conducting on the possible use of ferruginous bauxites from Washington County, Ore., as a source of primary raw material, do not "pan out", they will undoubtedly bring in bauxite from offshore points to produce alumina at this plant for reduction into metallic aluminum.

It is understood that the Reynolds Metals Co. plans to operate its Longview, Wash., aluminum reduction plant and that company, too, may carry on

certain new developments at this plant. The fate of the government-owned aluminum reduction plants at Troutdale, Ore., Spokane and Tacoma, Wash., hangs in the balance, but the continued operation of the huge aluminum rolling mill at Spokane is a factor with which to reckon.

The Columbia Metals Co., which will operate the government-financed operation at Salem, Ore., for testing the commercial practicability of producing alumina from Northwest clays, has submitted a bid to the Defense Plant Corp., to lease the Troutdale and Spokane reduction works. Other interests in the light-metals field are also eyeing these plants. Just what the final outcome will be, no one can tell at this time.

The Pacific Northwest is alive to the fact that we must work out an integrated development to keep our vast aluminum industry operating here. The key to the situation is the development of enough new uses for aluminum, pig and sheet, in this area to justify the continuance of all these plants.

Market development work is now in progress, and many companies in this area that have learned to use aluminum during the war for the production of aircraft and munition parts are considering new items for production. Beer barrels, irrigation pipe, furniture, window sash, the combination of aluminum with plywood, for the manufacture of furniture and railroad freight cars, are among the many items under consideration. The vast Boeing Aircraft plants in the Seattle area, one of the largest users of aluminum sheet in the world, will continue in operation after the war. Perhaps not on quite as high a scale of production as now, but the company will continue to be a large consumer of aluminum and its alloys in the postwar period. The Kenworth Truck Division of the Pacific Car and Foundry Co. has already announced a plant expansion, providing facilities for a new line of street transportation buses that will utilize aluminum and lightweight alloys to the fullest possible extent.

The war has greatly stimulated development of the chemical and electrochemical industry of the Pacific Northwest. Since 1940 two carbide plants, two alum plants, a ferrosilicon plant, and a sodium chlorate plant have started in the Portland area. A vast new fertilizer plant at Pocatello, Idaho, is a vital new industry for the Northwest, as is the production of aluminum chloride, started in Tacoma during the war. The DPC plant at Spokane, which was built to make magnesium by the ferrosilicon process, is now producing metallic sodium. The government-built carbide plant at Tacoma has been converted into a plant manufacturing insulation material for homes and industrial uses, from slag obtained at a nearby smelter. Tacoma, with important chemical plants producing caustic soda, chlorine, hydrogen, hydrochloric acid, and other chemical specialties, expects a larger than normal expansion in this branch of industry.

The $355,000,000 plant, built by the government at Hanford, Wash., for the production of the key ingredient used in our new atomic bombs, probably will be kept in a standby condition for possible use in case of future emergencies. However, there is no doubt that the scientists of America will bend every effort to put this new energy source to everyday use, and out of Hanford may come a new peacetime industry of great importance.

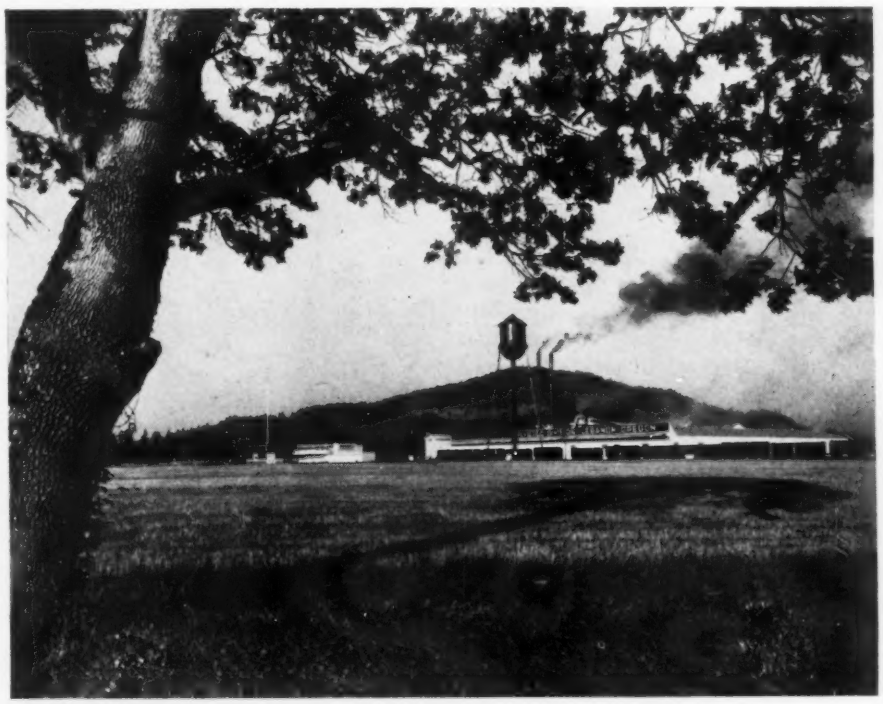
The availability of cheap hydroelectric power, strategic raw materials, both domestic and foreign, abundant sources of relatively pure water, and other factors, unquestionably will focus the attention of many other chemical manufacturers to this area in the postwar period. Reichhold Chemical has announced its intention to build a new adhesives plant at Seattle, and the Casein Co. of America has purchased a site at Eugene, Ore., to produce specialized glues for the plywood industry. The DPC-built coke plant at Tacoma undoubtedly will be started up again in the postwar period. It had to close during the war due to the inability of the coal operators in the nearby Wilkeson fields to hire enough miners.

Other new chemical plants, still in the negotiation stage, are expected soon to become actualities. In this connection, I am impressed by the fact that excellent opportunities exist here for the production of electrolytic zinc, rayon, cellulose acetate and its derivatives, sulphuric acid, soap, elemental phosphorus and its compounds, pharmaceuticals, artificial abrasives and countless other products.

Lumber Industry

Our paper industry will continue to grow. The Crown-Zellerbach organization has already announced a $15,000,000 expansion program in the Portland area for the postwar period with increased production of coated papers for book and magazine purposes. Similar development of facilities in the Puget Sound area by this company and other paper mills has been announced.

Several of the paper mills in the Pacific Northwest have already installed hydraulic debarkers. Units of this same type probably will be put into use by other pulp mills and perhaps sawmills as well. By this method, the mills get the bark off the pulp logs without wasting any of the precious inner pulp wood that is torn off by mechanical barkers used in the past. Further, there is possibility for a new industry in the use of some of this hydraulically debarked material from hemlock logs in the production of tanning material. The probabilities are that some of the Northwest paper mills



Plant of the Cascades Plywood Corp. at Lebanon, Ore., one of a number of factories in the Northwest making wood products in an expanding industry

will avail themselves of Alaskan forests, bringing the pulp here for fabrication into finished paper and paper articles.

Increased demand for a pulp suitable for use in the rayon industry is anticipated in the near future. Now that the tire companies are using a rayon cord for the production of heavy truck tires, the Pacific Coast market for this product is large enough to interest some enterprising manufacturer in locating operations in the Pacific Northwest. There are any number of paper specialties that can be produced here and the field is unlimited in the utilization end. Additional printing establishments, especially in the field of book and magazine publishing, are warranted by economic factors in this area, for the reading public shows an increased interest in Northwest literature, both factual and fictional.

In the field of wood utilization, plywood has a future that shows well-nigh limitless horizons, particularly in view of the world's postwar construction needs. In 1944, 1,484,899,000 sq. ft. of plywood were produced in the Pacific Northwest. Most of this was from Douglas fir; some of it was from Ponderosa pine. There is no question that the supply of number one peeler logs is rapidly disappearing, but new methods of utilization, such as the slicing of wood into plywood veneer, are being developed. Also, possibilities exist for joining together smaller-sized pieces of veneers into a plywood panel by using new resin bonding materials and ultra-high frequency or dielectric heating. These new production methods open an unique realm of possibilities for the plywood industry, particularly in the formation of complete units, such as drawers for furniture, molded seats, chairs, boats and many other items.

Timber Resources

It is well known that the states of Oregon and Washington have the largest stand of virgin timber in the United States. Since 1938 Oregon has been the leading lumber producing state in the country. Previously for a number of years Washington was leading producer. At the beginning of this century, the center of the lumbering industry of the Pacific Northwest was near Tacoma. Now it is between Eugene and Roseburg, Ore. At the end of 1943 in Washington and Oregon, there were available 450 billion feet of usable timber in the Douglas fir region west of the Cascades, and 100 billion feet in the Ponderosa pine region east of the Cascades. The states of Oregon and Washington have been producing, roughly, eleven billion board feet of lumber during the war years as well as furnishing additional timber for plywood and pulpwood.

Today, the lumber industry faces two problems. Due to the abnormal cutting of timber during the war, we are rapidly depleting our natural resources. The tremendous loss of timber by fires is another problem that must be faced. The disastrous Tillamook burn of 1933, together with the reburning of part of this area this summer, is a national catastrophe. The forward-looking lumber and paper mills of this area are engaged in promoting proper forest management that will produce timber and pulp wood on a sustained yield basis. The number of tree farms in the Pacific Northwest has increased tremendously in the last decade. Undoubtedly the enlightened timber interests here will work out a program in cooperation with various agencies that will put the Pacific Northwest on a basis of sustained production of timber for lumber, pulp and other uses.

Considerable work must be done in the field of wood waste utilization, both in cutting down the waste in the woods, and the utilization of the waste that is produced at the lumber mills. The Puget Sound Pulp & Paper Co. has already demonstrated that ethyl alcohol can be produced from sulphite mill wastes. It is hoped that the new plant at Springfield, Ore., that will go into operation around the end of the year, will demonstrate that alcohol can also be made profitably from sawdust and other wood wastes. Wood waste utilization in the fields of providing new materials for pulp, the production of charcoal, wood tar and derivatives, as well as fermentation products, all hold tremendous potentialities for this area.

The lumber producers in the Inland Empire see great possibilities in new processes under development for chemically treating lodgepole pine, so that this species, now of limited commercial use, can be utilized for telephone poles, fence posts, potato storage bins, etc.

Shipbuilding

The biggest question mark in our postwar picture is the future of the shipbuilding industry. At the peak, about 240,000 workers were employed in shipyards in Oregon and Washington. No one can definitely estimate the number of people that can be permanently employed in this line of industry. However, we do know that for a long period after the war there is going to be a tremendous amount of ship repair and conversion work, and these endeavors will employ several times as many people as there were in shipyards of the area before the war. There is no reason to believe that the creative genius and streamlined quantity-production know how demonstrated by the leaders of the shipbuilding industry, cannot be directed into other lines of manufacturing, while at the same time utilizing a part of existing structures and facilities.

The Navy and Maritime Commission are also examining ports of the Northwest for locations to lay up unused ships after the war. These ships will be dry-docked and kept in repair

Of growing importance in the Portland area are steel and metallurgical plants. Here is shown the plant of the Electrometallurgical Co. where electric furnaces are used to make calcium carbide and ferrosilicon. There are many other electric furnaces in area

as a hedge against any possible future emergency, while at the same time providing a measure of employment that did not exist before the war.

Steel

In the fields of metalworking, the new steel plants at Geneva and Fontana are of vital interest to the Pacific Northwest. We will need steel in large quantities after the war. A number of the subcontractors who got their start producing material for the shipyards and other war contracts are going to remain in business, producing new products which they will sell locally, export to the tremendous markets in the Philippines, China, Australia and the Orient, and even ship by water back to eastern coastal points.

Electric steel foundries of the area which were expanded during the war are now looking for new products which they can cast or produce to utilize their expanded facilities. Prevailing low power rates give these producers an added incentive for going after new business.

Textiles

Our textile industry holds intriguing potentialities. In Oregon alone there are nine woolen plants, and 14 plants producing linen fibre. There is an immediate opportunity for someone to come into this area to take this linen fibre and weave it into towels, table cloths and other linen articles that can be sold on a world market. There is no reason why there should not be more production of men's and women's clothing in the Pacific Northwest. The potential market in this area alone will support many new plants in these fields.

The wool growers of Idaho and the other parts of the Inland Empire see no reason why the fleeces clipped in this part of the Northwest should not be converted into woolen products near the source of the wool and thus create more jobs in this territory.

One of the most rapidly growing industries in the Portland area serving a national and international market is the Hyster Co., makers of industrial lift trucks, winches and tractor attachments. Plant facilities of Doernbecher Furniture Co. are seen in background

Foreign Trade

As to foreign trade and shipping, the Pacific Northwest looks forward to expanded trade with Alaska, Philippines, the Orient, Russia, Australia, India, and even Europe. In 1939, a typical prewar year, the ports of Oregon and Washington handled slightly over one-third the water-borne commerce of the Pacific Coast, and 6.4% of the U. S. total. As part of this total is intercoastal traffic, it is interesting to note that Pacific Northwest ports handled 4.2% of the U.S. import tonnage and 5.0% of total export tonnage.

Northwest ports have done yeomen service during the war. A good example of this is the movement of $761,000,000 of dry lend-lease cargo to Russia alone in 1944. This movement constituted over two-thirds of the lend-lease cargo shipped from all Pacific Coast ports to the Soviet government.

The ship operators and foreign trade interests of the Pacific Northwest anticipate greater use of our ports in the postwar period than before the war. From all indications their expectations are very well grounded.

To the Pacific Northwest, when demobilization is completed, will undoubtedly return most, if not all, of our sons and daughters surviving the conflict. Through their influence and the influence of other service personnel who have seen the Pacific Northwest for the first time will come many others who seek a dwelling place of less arduous climate and more generous living facilities. These additional potential industrial workers, together with the many new war workers who came to the Northwest from other sections of the country, will provide this area with a vast reservoir of trained workers that can be employed in the development of additional industries for this territory. New industries, taking advantage of natural resources and industrial opportunities, will undoubtedly create employment for these people.

There is no doubt that there will be a recession in the demand for power sometime soon after cessation of hostilities, when some of the aluminum and other electrochemical plants will reduce their production. However, the availability of power at the low prevailing rates of the region will probably attract other large power-consuming industries. The vast developed and potential supply of hydroelectric power should act as a catalyst for this development. At the present time more than four million kilowatts are linked together in a gigantic Pacific Northwest power pool that is serving the industries of this area. The new dam on the Columbia River at Umatilla Rapids will provide 630,000 kw. additional hydro power. At Grand Coulee only 890,000 kw. of a potential 2,160,000 kw. capacity are installed and many other hydro projects are contemplated.

Already power distributors of the Northwest are searching for new markets for electric power. Consideration is being given to electric house heating, and the possibility of generating steam by the use of secondary or dump power is no idle dream. In addition to power generation, the projected dams on rivers of the Northwest will provide water for large irrigation projects, which in turn will transform some of the present waste lands into fertile fields for new home seekers.

The great "Oregon Territory" is in its second pioneer stage. The groundwork has been laid. Truly the future of the Pacific Northwest is bright, and since electrical energy, electrical equipment and electrical appliances have become the warp and woof of American industry and American life, there portends for the electrical industry of the Northwest new realms for achievement —realms in which leaders of your industry already have set the pace for the Nation.

Coming San Francisco Bay Way

Industrial expansion running into hundreds of millions planned. World Trade Center and Apparel Center projected. Major steel and electrical manufacturing expansions announced. Retail face lifting under way

Robert C. Elliott
Industrial Editor, San Francisco News

Part of present facilities of Columbia Steel Co. on upper San Francisco Bay, where a new $25,000,000 sheet and plate rolling mill is to be built, are shown above. This U. S. Steel subsidiary recently added a high-speed continuous rod mill at this same works

THIRTY million dollars a year will be invested by Pacific Gas and Electric Co. in new facilities. General Electric Co. is engineering a new plant in the Bay area expected to employ 2,000 when in full production of heavy electrical equipment. Westinghouse predicts three times its local prewar employment in its already established manufacturing and service shops. Other highlights in the fast-breaking events of the San Francisco Bay area industrialization are:

Three hundred national manufacturers are surveying the possible location of new plants in California, and many already are under way in the Bay region. Scores of long established, highly diversified plants around San Francisco Bay are entering mass markets with consumer goods they never made before. They are investing millions in expansions and creation of more jobs. A new $25,000,000 steel rolling mill for strip, sheets and tin plate heads the Bay area's growth in the steel industry, which finds strong companies making diesel engines, food machinery and a sizable list of products (not to mention California's promised advent into auto building).

The chemical and petroleum industries are breaking new industrial frontiers around the Bay. Agriculture and food processing are stronger than ever. Retailing is prepared for unprecedented, pent-up peacetime business. Merchants are on the threshold of completely lifting the face of downtown San Francisco with new store buildings. The Bay area is going to exploit foreign trade and the tourist industry with redoubled vigor.

Construction is preparing to go all-out trying to fill California's program for vast building by private industry and business—construction of 625,000 homes much needed in the next five years—and city, county and state public works, of which 500 million dollars worth already is in sight. And not to be overlooked: globe-circling heavy construction and engineering will be done by Bay area "miracle" firms.

The West Coast is taking the jolts of war contract cancellations and dismissals of war workers better than it had any right to anticipate. Especially is the transition going smoothly, so far, in the Bay area. In fact, the West has gained an invaluable breathing spell in which to get ready for further and perhaps greater upheavals. The West is rolling in the billions of liquid assets with which to make good on continuing as the nation's Number 1 area of economic expansion. It has the management know how and labor skills.

Those are high spots in the outlook following V-J Day. They add up to significance for the Western electrical industry, since no industry stands alone, but rises or falls according to its part in the sum total of all activities. The electrical industry is so closely tied up with other industries that its expansion plans are both the barometer and the spearhead of the growth anticipated in all lines. For example, James B. Black, president of the 900-million-dollar Pacific Gas and Electric Co., isn't just guessing. He has down-to-earth facts on what lies ahead for central and northern California, on which to base extensions of facilities. "PG and E expects to invest 30 million dollars a year in expansion of facilities to serve homes, farms, growing factories and businesses," Mr. Black reveals. "Indefinitely—and without a bit of trouble! We can and will finance any amount necessary to meet the growing market."

So, despite the fact that from the Tehachapi to the Siskiyous, Pacific Gas and Electric has "one of the world's greatest power pools, 100% greater than Boulder Dam and 60% greater than Grand Coulee and Bonneville dams combined," it already is embarking on expenditure of two to three million dollars in San Francisco, ten million in the East Bay, and five or six million in rural electrification extensions. Orders will be placed to the tune of tens of millions for local manufacture of everything possible, Mr. Black says. So if PG and E invests 150 million in the next five years, as forecast, it is an indication that the elec-

trical industry knows that good times are to be tapped by it in the Bay area.

General Electric and Westinghouse are decentralizing to take partnerships in the integrated industrialization of the West. G-E has 57 acres at San Jose on which to build its great heavy equipment plant, and another site at Anaheim, Calif., for a plastics industry. Besides, it will continue its busy light bulb and a service plant at Oakland, a big sales and headquarters force at San Francisco, and will keep on making all its electric irons (Hotpoints) in southern California. G-E employs about 2,000 in California. A letter from G-E President Charles E. Wilson states the company's postwar program, which can be summed up: Twice as many General Electric jobs as before the war! Higher wages as rapidly as labor and factories produce more. . . . Yet prices held down. . . . Decentralization Westward!

Westinghouse has more than doubled its Emeryville plant in the East Bay, and, out of a 30-million-dollar national postwar expansion and re-equipment program, announces Los Angeles and the Pacific Northwest also will get improvements. For Westinghouse, too, has its eyes on what the West's superabundance of cheap hydroelectric power will mean to its sales, not only to utilities but to electric equipment and appliance sales for homes. "Western peacetime production by Westinghouse should be three times greater than prewar," says Charles A. Dostal, its Western vice-president. "Our overall sales in this area should be 40% above 1940-41. Our California pay roll carries 1,350 persons, about double prewar." Westinghouse's international company is establishing an office in San Francisco "to develop the great trade that will go through Western ports."

Potentialities of markets among the one billion peoples of the Pacific are arousing the interest of many manufacturers. O. C. Hansen, San Francisco foreign trader and "imagineer" of the San Francisco World Trade Center, points out that there is tremendous demand in the Orient, Latin America and world-wide for every kind of electrical equipment. The manufacturer who goes after export business can count on it keeping his plant busy two months out of the year.

Moreover, Pacific Telephone & Telegraph Co. is in the market for tens of millions of dollars worth of equipment, as fast as it can catch up with unfilled orders for service. PG and E surveys show a retail potential for domestic electric and gas appliances totaling $387,462,667 for six years in central and northern California, besides the hundreds of millions to be spent on building and furnishing new homes. Scores of small home-owned electrical plants will share the rush business. Firms like Wesix that have made good will capitalize on the increased use of electrical energy due in homes, farms and factories.

The skyrocketed Bay area electronics plants, while due for a let-down from war peak, still will be heard from in peacetime. There are the two young radio hams, Eitel and McCullough of San Bruno, who, tinkering with sets in their little shop, boomed into Eimac's $1,500,000 plant that did 50 million dollars worth of war work, Heintz & Kaufman, Dalmo-Victor, Lewis Electronics Co., Technical Radio Co. and others are strongly in the picture. Radio and industrial fields for electronics will be tapped.

Consider what is happening to fire the hopes of electrical manufacturers and utilities. "The Bay area is getting more live, red-hot prospects for factories today than ever before." Jim Black explains. "This comes from the definite decentralization of eastern industries Westward. It's not confined to the immediate metropolitan center. New industries are taking sites in fast-growing cities like Bakersfield, Fresno, Stockton, Sacramento and San Jose. San Francisco is the strategic gateway to a veritable empire of the great Central Valley, one of the richest farming regions on earth, its cities attracting new, diversified industries, a region teeming with potentialities for harnessing the water and power of the High Sierra." PG and E is confident of marketing its postwar surplus energy, as well as such additional hydroelectric power as may be developed in future.

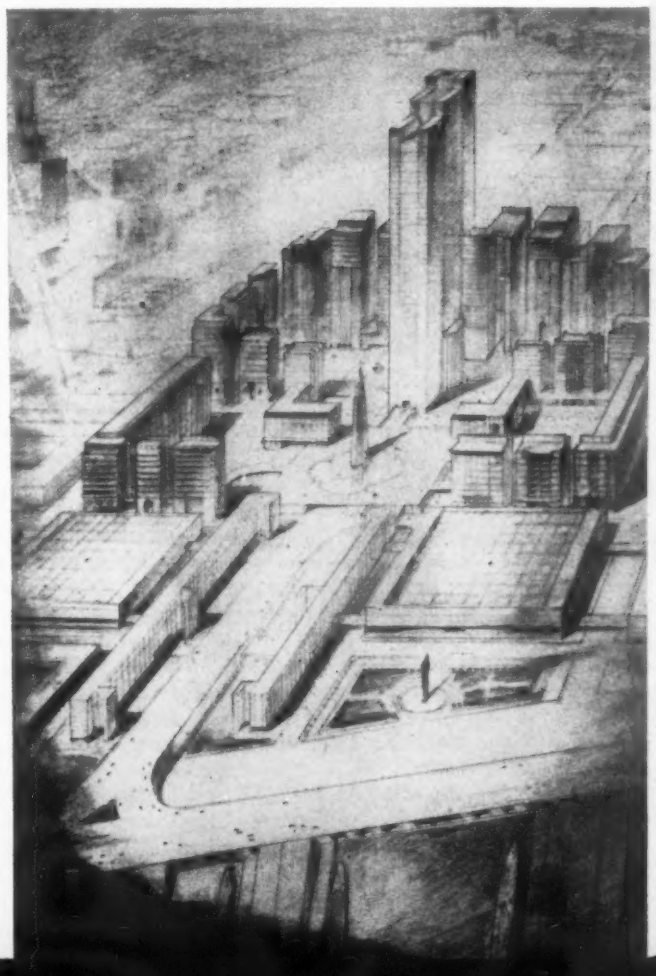
The Southern Pacific Co. and its president, A. T. Mercier, spell out the industrial expansion concretely. Today 300 eastern industries are actively surveying prospects for starting branch plants in California, it is found from filing cabinets that S.P. has crammed with data on its plant requirements, divided rather equally between southern California and the Bay area.

"Industries are moving West at the greatest rate we have ever seen," Mr. Mercier recounts, elated at returns from the national advertising campaign by S.P. for new industries. "Factories have been located on S.P. lines at the rate of one a day for 15 years. Now the Pacific slope is proving the fastest growing region in the country, and the new plants locating here are a better cross-section of American industry, from heavy machinery to consumer goods."

Other Industry

This new "Westward the Course of Empire"—of factories and people and markets—is not something in a rosy-haze future. It is taking place daily before our eyes. For example:

Western Crown Cork & Seal Corp. (you use one of its caps when you drink a beer or coke) is rushing to build a three-million-dollar layout on 33 acres on Bayshore Boulevard, San Francisco, to employ 1,500. Pepsi-Cola projects a half-million-dollar bottling works in Oakland. International Minerals & Chemical Co. has 25 acres at San Jose for an amazing California



Visioned for San Francisco is a World Trade Center—a 35-million-dollar sort of "Rockefeller Center" for all foreign trade, consulate, shipping and associated interests. Site is the old produce center between the financial district and the Embarcadero

product—monosodium glutamate concentrate—made from waste beet sugar pulp into a powder with which can be boiled up "chicken" or "vegetable" soup that tastes like the real thing. American Home Product Co.'s subsidiary, H. H. Clapp Co., is manufacturing canned baby foods at a $200,000 San Jose plant. Now on its 20-acre tract, it will add two units to produce cosmetics and G. Washington concentrated coffee. Count 200 to 300 jobs there.

H. J. Heinz Co., with Pacific Coast main plant at Berkeley, is completing a $150,000 cannery at Tracy, forecast to provide 500 year-round jobs. Bercut-Richards Canning Co. is building a $600,000 cold storage plant at Sacramento, to employ 3,000 at its peak. Continental Can Co. is starting a $350,000 can factory adjacent to Bercut-Richards, promising 400 to 500 more jobs. Similar employment is in prospect near San Leandro, where Pacific Can Co. plans a new plant on a 20-acre site. Glass Containers Inc., subsidiary of Fibreboard, is building a glass bottle and fruit jar plant on 15 acres at Antioch, that will provide 250 jobs.

Reynolds Metals Co. plans a San Francisco aluminum foil, packaging and label plant to employ several hundred. Cuneo, one of the nation's major printing companies, is hunting a Bay area site to print Western editions of national magazines that will open 2,000 jobs. International Business Machines has a West Coast plant at San Jose.

Steel

Much Bay area industrial promise is born from steel, "mother of industries." Industrial news of highest importance is the decision by United States Steel Corp. to build a 25-million-dollar, ultramodern thin-steel rolling mill up the Bay at the sprawling, widely diversified Pittsburg plant of its Western subsidiary, Columbia Steel Co. This has been a major need in the industrializing of the West, which has not had such facilities.

With continuous, almost automatic type rolling machinery that has revolutionized the mill industry within 20 years, the Bay plant will supply the cold-rolled, high-finished steel sheets required for Western manufacture of refrigerators, washing machines, stoves, utensils and an array of products. It will zip out tin plate as thin as .006 in. for the tin can industry. Western canneries, most heavily concentrated around the Bay, use one-third of all tin plate required by the U. S. canning industry. U. S. Steel will increase its Western employment of 6,000 persons.

Bethlehem Steel Co. not only has greatly expanded its San Francisco and Seattle capacity but, besides its steel works at Los Angeles, has acquired other companies at those places and is ready to build steel depots or warehouses on the Coast, including one in San Francisco costing more than $250,000. Going places in steel products, many venturing into new products, are Soule, Rheem, Enterprise Engine & Foundry, General Metals, Yuba Mfg., Edwards Wire Rope, Gilmore, Judson Pacific and many others.

Gar Wood Industries Inc. announces it will spend several hundred thousand dollars decentralizing from Detroit and building a factory around San Francisco to build earth-moving, truck and tractor equipment. Here is new heavy industry, putting the Bay area into scrapers, bulldozers, scarifiers, ripprooters, hoists for trucks, dump truck bodies and truck tanks, and opening quickly up to 600 jobs.

Henry J. Kaiser and Graham-Paige Motor Co. did the spectacular when they combined to manufacture a West Coast automobile — a "lightweight, large, low-cost" Kaiser car. Fourteen experimental models have been made, though most of the manufacturing and distributing plans remain to be worked out. Yet this should not obscure how big the automotive industry already was here, the increasing manufacturing of parts and assembling on the Coast, and the Bay area assembling works of General Motors, Ford and Chrysler. The latter has bought a $60,000, 40-acre addition to its existing plant at San Leandro.

The story of new industries for the Bay area cannot be told in one article, let alone a review of the expansions planned by existing plants, which make up the solid foundation. Five hundred plants around San Francisco Bay have projected expansions and improvements, according to Southern Pacific estimates!

No sooner was the war over than Paraffine Companies, Inc. (Pabco) announced that construction would begin at once on the first plant of a four- to five-million-dollar expansion at its "eleven-factory", 1,600-employee linoleum, paint and roofing company at Emeryville. Pabco sent out a call for workers to fill several hundred permanent jobs, besides holding open jobs for its more than 300 employees in the armed services.

Marchant Calculating Machine Co. at Emeryville, humming with 1,000 employees, started looking for an additional 800 postwar employees, and had engineering plans ready for an investment of $1,500,000, doubling and greatly improving its factory. It could add a $50,000 monthly pay roll right away. It had unfilled orders of more than two million dollars.

Schlage Lock Co. at San Francisco, trying to speed conversion to its hardware lines in order to hold all its skilled workers, disclosed that it will get into consumer goods it hasn't previously made, for national and international markets.

Five Bay area diesel engine plants, manufacturing 96% of diesels made West of the Mississippi, converted overnight to power plants for marine and industrial use. This includes Joshua Hendy Iron Works, whose gargantuan war-built shops at Sunnyvale have brought new heavy industry to the West and thereby have generated a problem of magnitude in converting to peacetime. Joshua Hendy partly cushioned its transition by having production under way on 51 semi-portable "packaged" turbines for Soviet Russia ($1,500,000) and 36 stationary diesel power units of 250 hp. for Britain.

The pacesetting Food Machinery Corp., with headquarters at San Jose for 15 farflung factories, was ready for postwar with many startling products, with two and a half million dollars to spend for plant expansions, including a central engineering and research building at San Jose and expansion of its Bean-Culter plant there. It also will expand its spray plant at Richmond.

Apparel City

San Francisco's most imaginative project is Apparel City, a center for the entire garment manufacturing industry, to be sped into early construction on a 32-acre site already purchased in the Portrero district, ten minutes from the heart of the city. In making California a world style center, the state already has the outstanding place in sportswear, and department store buyers are flocking here from all over the country as the industry grows by leaps and bounds to the clip of about a 400-million-dollar-a-year trade. Apparel City will be a model of light-flooded buildings, with parkways like Treasure Island at fair time, dramatizing styles.

In retailing, the state reports that California requires 60,000 to 75,000 new private enterprises — stores of every kind, and barber, beauty, cleaning, repairing and all types of service shops. "Opportunities are everywhere," as R. B. Hale, merchant leader, declares. "The field is wide open for the little fellow to get into his own retail or service shop." And thousands of returning veterans will be doing just that, each reaching for his share of pent-up purchasing.

Retail Expansion

Here are evidences of the boom in San Francisco retailing: The famed New York department store of R. H. Macy & Co. has bought O'Connor,

Moffatt & Co. and will expand on three streets. Hale Bros. will invest ten million dollars in San Francisco, Sacramento and San Jose, including six million for a new building and store property at Market and Fourth streets. I. Magnin & Co., affiliated with Bullocks, will rebuild the Butler Building into a white marble and black granite department store. Woolworth Co. will raze the Flood Building to erect a Market Street Five and Dime store. Roos Bros. is expanding into Sacramento. Crystal Palace Market is improving at a cost of $1,250,000. A new produce market is planned costing several million dollars.

The list could go on and on, to a total of tens of millions. Many investments will be made to cater to tourists, expected in unprecedented numbers, for travelers, even prewar, spent more than 33 million dollars a year in the Bay area.

World Trade

The World Trade Center, a 35-million-dollar sort of "Rockefeller Center" for all foreign trade, consulate, shipping and associated interests, is a stirring, creative proposal for lower downtown. Its feasibility has been established, and steps are under way on acquiring the site and financing. The shift to the Pacific is on, and scores of industries have tangible prospects of selling to mass markets abroad.

Henry F. Grady, president of American President Lines, asserts that Pacific Coast ports and heavy waterfront employment are bound to hum through a five- or six-year restocking period. The West Coast will be served by the biggest merchant marine in history, as well as by airlines fanning out to all parts of its trade territory, the nation and world.

The Bay area is the capital of builders and engineers who will tackle any job, anywhere on earth, as they proved in doing billions of dollars worth of "impossible projects" the globe around during the war. They will help industrialize and develop natural resources in Pacific and Latin American lands.

Manufacturers in seven Western states stand ready to spend 432 million dollars in postwar improvements, exclusive of vast sums in steel, light metals, railroads and utilities, they have told the Federal Reserve Bank of San Francisco.

The State of California has 300 million dollars financed for its postwar program, besides planning 115 million dollars for three years of highway building. Cities and counties swell this total to a half billion already in sight, with San Francisco just now in the process of considering 28 projects totaling $177,454,000.

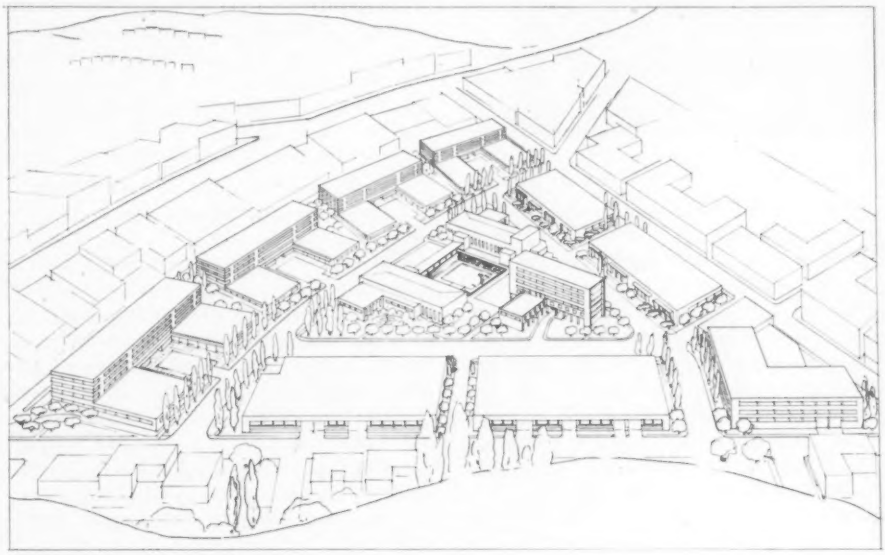
The state officially reports that Californians will build 125,000 homes a year for five years. Metropolitan San Francisco has 48,832 lots on which postwar homes are planned in nine counties. The state forecasts 160,000 to 220,000 jobs will be opened up by some 950 million dollars of construction a year, 300 to 400 million of it in home building.

Outlook Bright

All these activities spell big things for the electrical industry. Wherever you turn you find the electrical industry has a hand; notably for example, it is closely allied to the petroleum and chemical industries, which have built a center of industrial chemistry around the Bay. "The petroleum industry is revolutionizing itself into the glamorous mysteries of chemistry," declares Harry D. Collier, president of Standard Oil Co. of California. Its refineries on the Bay and in Southern California turn out 500 products, many going into plastics, synthetics, plywood and a host of industries. Its amazing new products are a story in themselves.

At last the West has the cash to finance whatever industrialization it dares undertake. William A. Day, president of San Francisco Federal Reserve Bank, points out that individuals and companies in seven states have liquid assets totaling 20 billion dollars, roughly ten times all the government spent on war facilities, two and a half times greater than prewar. But more important, it has top managements filled with venture-spirit and the know how to blaze new frontiers in enterprise. The talk stage about our vaunted postwar future has passed. Now it's produce—or else. For, we're in the peacetime. And how are we taking the transition?

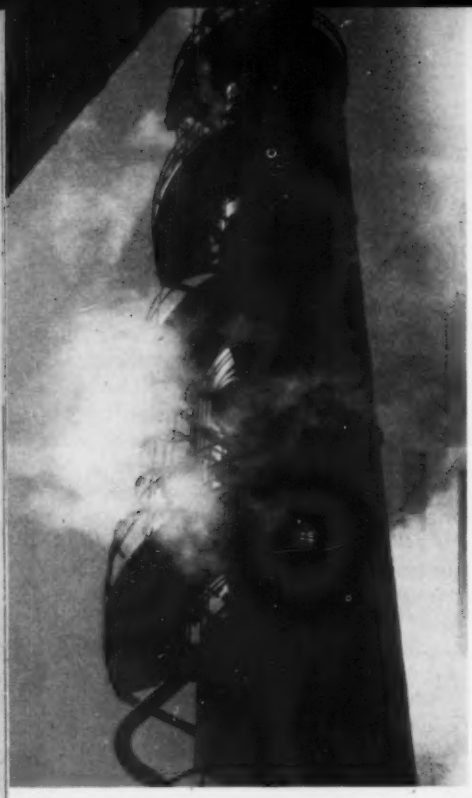
All the Pacific Coast centers had a total of 155,000 discharges of war workers in two weeks after victory. Yet at the same time there were far more than this number of jobs being offered. The U. S. Employment Service alone had 95,000 openings. The Bay area scarcely felt it when less than 20,000 workers were let out of war work after Japan's surrender. It is declared to have 50,000 jobs still open!



To be sped into early construction is San Francisco's multi-million-dollar Apparel City on a 32-acre site ten minutes from the heart of the city. California is rapidly becoming the World's style center, already with a 400-million-dollar-a-year trade. The entire garment industry will be centered in Apparel City which will be a model of light-flooded buildings with parkways like Treasure Island at world fair time

But this rosy immediate picture is not one to lull industry and government into blissful optimism. It means that instead of an abrupt, disastrous end of war activities, the Pacific Coast has months of continued heavy pressure in delivering men and supplies to and from the Pacific. This gives the West a crucial, prolonged breathing spell, in which to get all our much-boasted expansions, new shops, new products, and new factories going. If they are rushed simultaneously with the return of hundreds of thousands of veterans during the next ten months, there will be jobs—not enough at first for everyone who wants to settle in California, but record-breaking peacetime employment and a state population bound to soar above nine million by 1950.

The test is right now, and what enterpriser after enterpriser is doing about the opportunities indicates that the San Francisco Bay area, together with all the Pacific Coast, can sail through conversion storms and emerge permanently better off than previously predicted.



Southwest Industrial

Southern California expects to retain good proportion of its aircraft, aluminum, steel, synthetic rubber, shipbuilding. Thousands of small industries have major reconversion problem

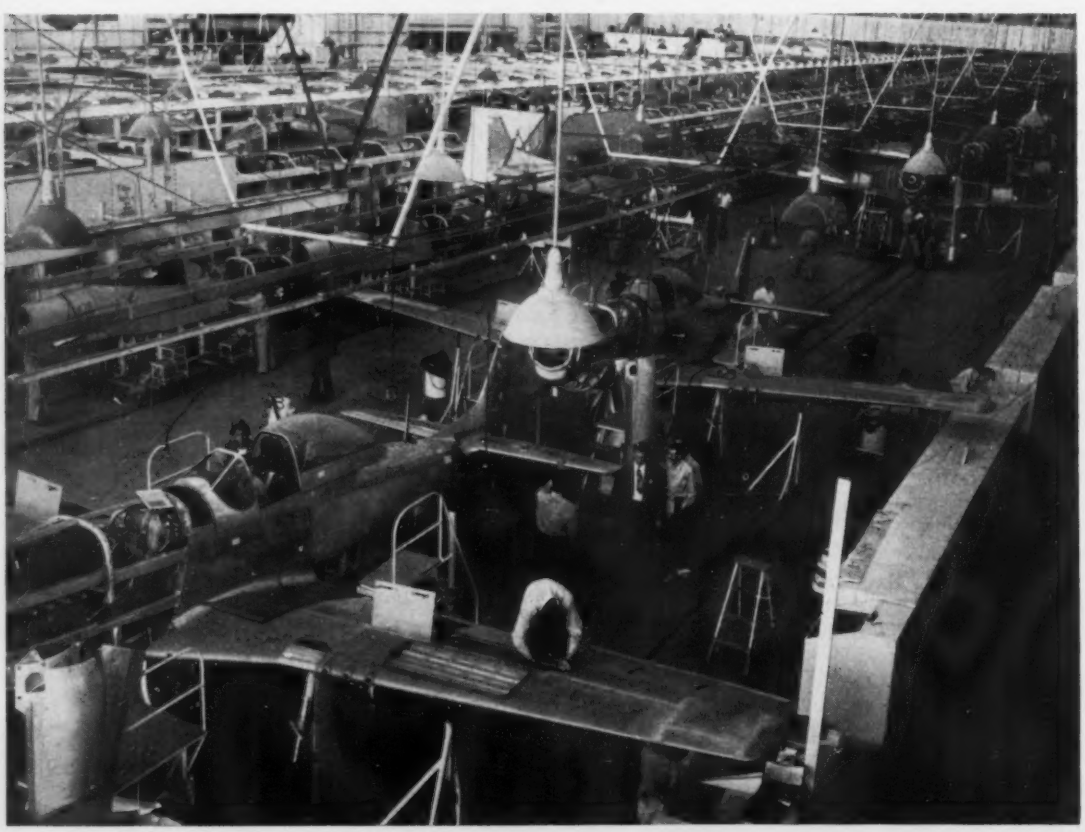
CONVERTING from total war to total peace, although planned for in many different ways and expected to take place gradually, has suddenly been thrust upon us to accomplish successfully and at once. Whatever our planning was worth, we cannot delay for further events, or the perfecting of new plans. With our sleeves rolled up, we must now be actively rebuilding a better peacetime economy. Before us are three tasks: Reconversion, conversion, expansion.

Reconversion in southern California, that is, getting back to normal production lines will take place without much difficulty. Let us look at some of our major prewar activities: Motion picture production, although limited in scope because of manpower and material restrictions, has continued all during the war. Normal conditions will permit healthy production of good entertainment. Most of the studios have plans all ready to go for construction of new facilities. There is a ready market for the product, full employment in the industry is needed and acceleration under the green light will be most welcome.

The oil industry has been actively providing one of the most important sinews of war and caring for essential civilian requirements at the same time. The enlarged and improved plants with great new facilities for producing high octane fuels will be kept busy filling the larger and more selective future market. Some concern has been expressed regarding the depletion of our oil deposits. Tidewater location of the refineries in southern California will permit continuation on foreign supply, if necessary.

Food packing and processing, although expanded during the war, will require still greater capacity to meet the increased demands of the growing Western population. New and improved methods of packing and preserving developed just prior to and during the war will be extended to other products and continued to the advantage of all—the consumer, distributor, retailer and packer. Wide public acceptance of frozen foods portends for this industry tremendous expansion. Marketing possibilities seem almost unlimited, and to the utilities it means new industrial, commercial and residential business.

Furniture manufacturing, although devoted extensively to war production, even before the close of hostilities, has been getting back into the groove to supply the pent-up demand running into hundreds of millions. With manpower limitations lifted this industry should soon be turning out its wares on a larger-than-ever scale. Scarcity of materials at first may force substitutions such as aluminum tubes and shapes, or steel tubing, plastics and synthetic fabrics. It may well be that use of such materials will result in new and attractive permanent designs. Western manufacturers have found that they can successfully compete in



Assembly lines like these at North American Aviation will continue in operation on greatly reduced production schedules. Spare facilities may be devoted to other products in many of the great war-expanded plants of the area

Conversion

O. K. Buck

Department of Water & Power, Los Angeles

eastern markets, in spite of shipping differentials, provided they do so on the basis of quality or distinctiveness. A recent demonstration of this has been the popularity and ready sale in the better stores of the country of the typically Californian redwood garden furniture. Although this is a novelty which may in time wear off, the manufacturer who is ready with other styles which exemplify California living can continue to capitalize on the growing eastern consciousness of California.

Clothing manufacturing has made its amazing growth from $67,000,000 in 1939 to $200,000,000 in 1944, supplying civilian markets principally. This was done despite material shortages, WPB orders and price ceilings. The Hollywood and Los Angeles labels sell merchandise because the cutters have wisely embodied creative design and distinctive styling. Mr. Street, merchandise manager for Marshall Field said to the writer recently, "It's not because we like Los Angeles that we watch your markets. We buy your merchandise because we know it sells. The only advice I can give is, 'Just give us more of the same'." He then went on to volunteer advice which is worthy of note, because it illustrates a handicap which should be overcome. "We send our buyers out by plane to save a few days' time. Then, when they arrive, they spend two or three weeks traveling around from place to place trying to see the merchandise they would like to buy, and don't see it all. They would buy much more if you had one central location where our buyers could see all of the products which you have to offer. This goes not only for your clothing, but your furniture, ceramics, novelties and all the myriad things you have and will produce in the future."

To go on down the list of prewar industries would further demonstrate that, although problems of reconversion are presented, they are such that enterprising businessmen can solve them with their usual keen judgment and initiative.

Conversion is the task that will try our resourcefulness and which must be accomplished by concerted effort and intelligent action. Utilizing the warborne industries, plants, shops, and tools for the production of salable civilian goods will do much to maintain a stable economy. Let us analyze some of our newly acquired industries:

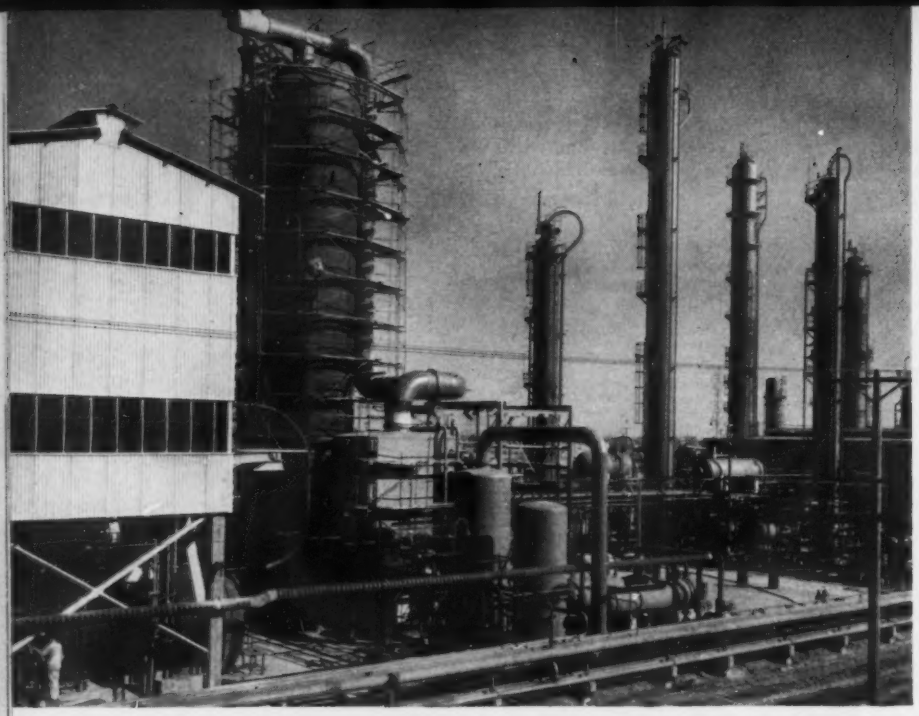
Synthetic Rubber

Synthetic rubber is a natural for this area. We have the basic raw materials available within the immediate area and the power necessary, the tire factories, and mechanical rubber processors established locally. Experts estimate that when natural rubber is again available uses will be divided about 50-50. Synthetic, being a laboratory product, lends itself well to control. During manufacturing process the formula can be varied to produce the type of rubber best suited for its contemplated use. For many purposes synthetic rubber is superior to the natural, and no longer will selection be made on the basis of lower cost. Even so, it is expected that the cost of synthetic will compare favorably with and not be subject to the violent fluctuations of natural rubber, thus stabilizing the market. The immediate market does not indicate that all of the nation's new rubber plants will continue operation after restoration of the plantations for longer than the period required to replenish our depleted supply. Perhaps half of the plants will survive, including the Los Angeles facilities.

Light Metals

The aluminum forecast is dependent upon market. The vast expansion of production capacity was provided to build our staggering fleet of military aircraft. Will industry generally increase its uses of this metal, to make up for the loss of market for aircraft? New alloys which provide greater strength, durability, and serviceability are helpful. The use of aluminum during the latter part of the war for structural purposes other than aircraft, has demonstrated its superiority wherever weight is important. It is an established fact that with transportation equipment the increase in pay load far more than offsets any difference in cost. The use of foil for packaging and insulation will, with the new methods

Whether this giant 200-ton ladle at Fontana will continue to pour steel ingots is of vital concern to southern California and whole Pacific Coast. Western business leaders are considering underwriting the warborne steel industry



Butadiene plant of Shell Union Oil Corp. where catalytic dehydrogenation unit splits butylenes into butadiene and hydrogen. Butadiene is used in the manufacture of synthetic rubber. With basic raw materials within the immediate area and tire factories and mechanical rubber processors established locally, synthetic rubber plants will continue in operation

developed, greatly increase. It has been estimated that, even though foil has been so extensively used for packaging military supplies, foil rolling capacity is far below expected demands. The use of powders, particularly for paint, is expected to increase.

The know how of the vast army of workers and technical men engaged in aluminum fabrication will be a forceful influence in extending its use in metalworking. One of the deterrents to acceptance of aluminum in the past has been the fear of industry to place itself at the mercy of a single supplier. This has been remedied. Several of the independent companies engaged in the production or processing of aluminum during the war have announced their intention to remain. The West Coast plants, however, to stay in business, must have a better integration of the entire industry.

Alumina must be produced locally. Normal economy will not permit the higher cost to ship alumina across the country. Southern California, closer to the bauxite mines of Surinam and Haiti, and accessible to the potential supply in the South Pacific, with its natural gas, lime deposits, and soda ash, is a logical location. The rolling mill, located in Spokane for military reasons, is unfortunately distant from the Western market, particularly the large southern California market. The electrochemical, metallurgical power rate in Los Angeles for aluminum reduction, although not quite as low as Bonneville, is competitive with other locations, particularly when all factors are considered. The enterprise of Western businessmen in encouraging the use of aluminum and the integration of facilities will determine the future of this industry on the West Coast.

Magnesium is a metal with great potential future. The industry, however, is still in its infancy, even though it has made great strides. One difficulty is the element's strong affinity for oxygen, control of which has not as yet been entirely satisfactory, which makes it highly corrosive and inflammable. The use of gases in welding and casting provides workability, and pickling and preservative coatings extend its usability, but they are expedients. Another difficulty is its nonflexibility, which makes it subject to stress corrosion and shattering. The future of magnesium still lies in the laboratory and will be extended when new alloys are devised which will eliminate its unwanted inherent characteristics. The strength-weight ratio of the present alloys is superior to that of other metals. For that reason national production capacity was greatly increased during the war. The expansion, however, was greater than the present rate of use will support. Basic Magnesium at Boulder was shut down long before the end of the war and there is some doubt that magnesium production there will be resumed in the immediate future. The plant facilities, however, have been used for production of chlorine and other purposes, and may continue to be because of the great demand for space and equipment in this area.

Steel

Steel is basic in our industrial economy. It cannot be expected that other metals will soon displace steel, except for those uses for which the other metals are particularly adapted. Present national production capacity of steel is over 94 million tons annually, whereas the capacity for copper, aluminum, and magnesium, is less than 3½ million tons. The lack of local production, thus forcing a higher cost on Western manufacturers because of added freight, has been a handicap in competing with their products on the eastern markets.

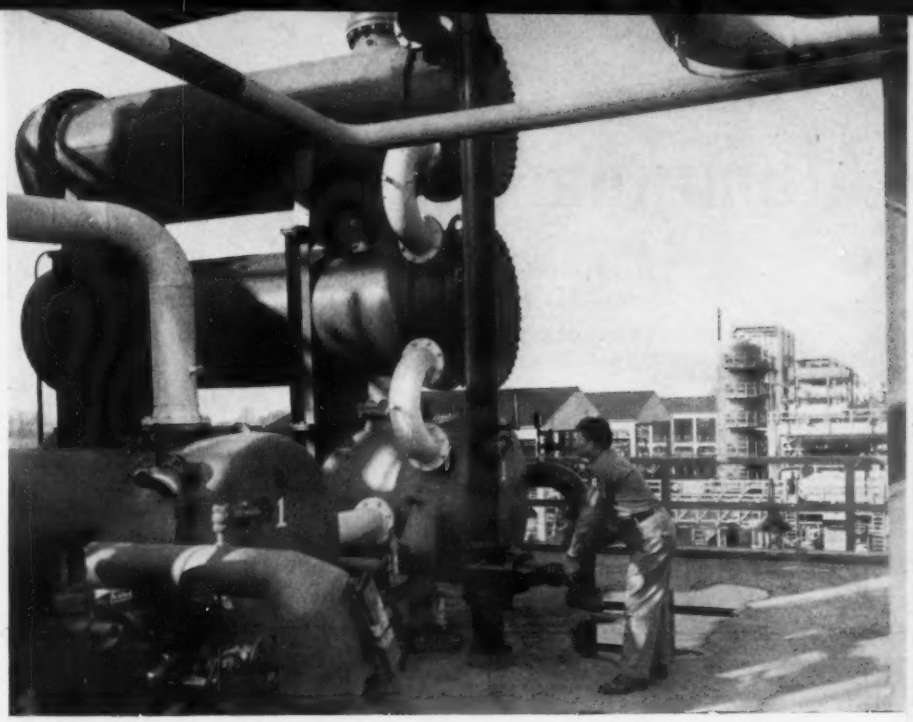
At present the Western steel picture is confusing. The present operator of Geneva states that it has no intention of acquiring that plant for postwar production, and at the same time announces a new $25,000,000 sheet rolling mill to be built at its subsidiary's Pittsburg, Calif., plant. Therefore, if Geneva and Fontana are to be operated, it would appear that Western businessmen must make the undertaking. Henry Kaiser has already proposed such an arrangement for both Fontana and Geneva.

The shift from producing one kind of steel, ship plate, and for one customer, Uncle Sam, will require large investments in additional facilities. The thousands of types and forms required by industry generally mean that the market for each kind will be quite limited and, in some instances, the operation may not be economical. Western industry, however, is growing rapidly and will, in time, provide satisfactory markets, especially with the opening of Far East trade.

Producing steel in the West is now pioneering, requiring courage and fortitude, but Western people are experienced pioneers. These plants were (and still are) necessary for national defense. They are likewise needed to enable the West to make the industrial expansion which will support its increased and ever-growing population. The entire West is hoping that the Fontana and Geneva plants can and will be successfully operated in the future.

Shipbuilding—Aircraft

The shipbuilding industry is already engaged in repair and modification of government ships and the building of needed civilian craft, particularly fishing boats. This will continue for some time. Our fleet of naval and merchant ships must be kept in repair, and as vessels are made available for release they must be suitably converted for peaceful purposes. There will continue to be demand for construction of private craft on the East as well as the West Coast. Moreover, shipyard fabrication facilities will find some usefulness in supplying the construction industry to fill the backlog of building



The butadiene and styrene which did not combine to make synthetic rubber are recovered to be used again at the co-polymer unit of the California Synthetic Rubber project operated by United States Rubber Co. at Los Angeles. Here is shown a condenser where butadiene is cooled, condensed and returned to storage. Conditions are conducive to continued operation

demand. Nowhere nearly the peak wartime employment will be maintained, of course, but the shipbuilding industry will be an important contributor to our industrial structure.

Aircraft construction in southern California has exceeded that of other parts of the country. This area had been recognized as the aircraft capital before the war. Because of its ten-fold, or more, expansion, it is treated in this discussion under conversion, rather than reconversion. The remarkable achievement by local manufacturers was largely due to subcontracting and other outside plant production. This meant that perhaps as many as 2,000 small plants were engaged in making parts or subassemblies. These small plants are the ones which are cast adrift and require help.

The aircraft industry, shrinking back within its home plants, will carry on, on a one-shift basis, the production of larger and more efficient transports, and the research and development necessary to continue our lead in military as well as civilian planes. Even though the main plant facilities have been greatly expanded, much of it will be required and it is expected that very little will be released. If however, it develops that the industry has unneeded space and machinery, these will be quietly absorbed for other industrial uses. Postwar contracts for aircraft already let to local firms, although but a drop in the bucket as compared to war output and the marvelous performance of the ATC, indicate that our previous status will be maintained. Thousands of aircraft workers released, to be employed elsewhere, are greatly reducing staffs, but the remainder will constitute an important part of industrial life.

Small industrial plants brought into being or greatly expanded during the war have some serious problems. They have trained workers, management organization, machine tools, facilities and factory space. On the other hand, however, they must find products to make, analyze markets, develop competitive production methods, explore distribution channels, build sales forces, advertise their products, and create public acceptance. Fortunately, much help is offered to them. The Los Angeles Chamber of Commerce, the California State Chamber, the State Reconstruction and Reemployment Commission and many other organizations and agencies have been active in this respect. Factors are favorable. Population and markets have expanded, production technique and labor know how for needed products not now made here are available. Eastern manufacturers are establishing branch plants to make locally products to fill Western markets. With the initiative and venture-spirit of Western businessmen, these local plants will meet their problems and succeed.

Industrial Expansion

Industrial expansion above the prewar level is necessary if southern California is to provide a livelihood for its expanded population. Seventy-five per cent of the newcomers, in reply to questionnaires, have indicated their intention to remain here. Even though one out of every five dollars spent here is brought in by tourists and funds spent by the large population of retired people is helpful, we must also have additional gainful occupation besides that offered by the service trades. Yes, and still greater employment must be provided for the additional thousands who are still coming.

A survey taken by the Army shows that the greatest migration of ex-service men is westward. A recent interview with 100 industrial executives throughout the East proves that they are interested in southern California. In establishing new industries we must endeavor to fill up industrial gaps. We must seek those which are not competitive with existing business, or for which there is still room.

The assistance which the utility can give industry is quite helpful and, in some instances, extremely valuable. Mention is made here of some of the services rendered to industry by the Department of Water and Power. When the war first started, one of the big bottlenecks was machine tools. In cooperation with the WPB, the department surveyed, listed and coded over 60,000 machine tools in some 2,000 plants. By mechanical sorting, any desired machine, to perform any given process, could immediately be located. Procurement officials and prime contractors found this service an effective means of determining where to let contracts and helped utilize the small plant most effectively. This file has been kept up-to-date and is now useful in converting in the other direction.

Later, as industrial floor space became more acute, a service was set up to include listing of available space. By checking on power turn-offs, availability was determined and the information given to those who needed it. In this way practically every square foot of industrial buildings was productively utilized. Assistance was given in locating 7,461,000 sq. ft. for 1,376 firms. This service also has been the key to locating many plants in the area.

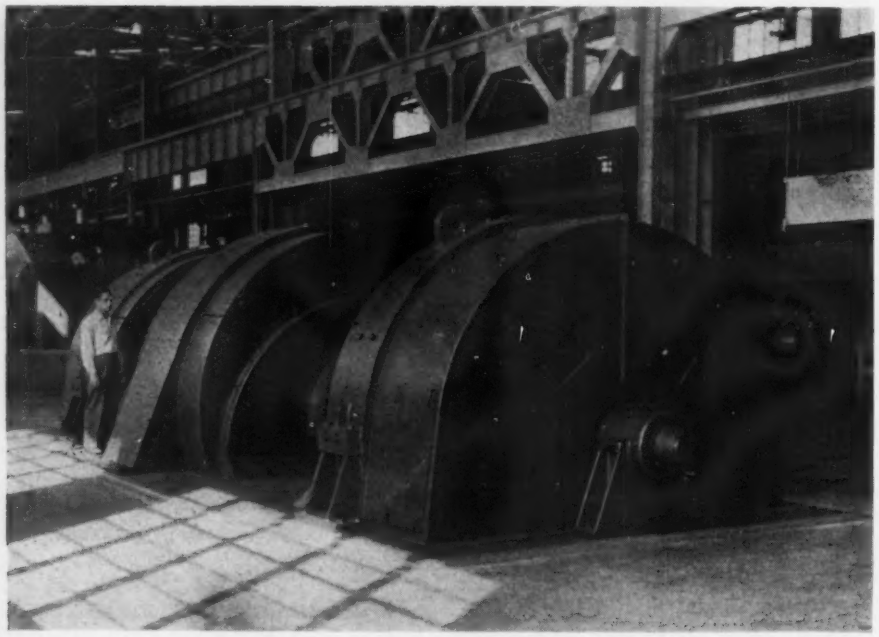
As the war drew to a close, it was apparent that many industrialists needed stimulation to plan for the future and give some thought to the problems they must solve, such as, contract cancellation, T-loans for operating capital, allotment of materials for civilian production, new products to manufacture, etc. To serve this purpose a monthly news-letter entitled, *Production Expediter* was brought out, commencing June 15, 1945. The many commendations received indicate that this service has been worth-while.

Successful conversion and industrial expansion are vital to the utility as its welfare is dependent upon the welfare of the community. Whatever efforts it puts forth to make jobs will pay dividends directly or indirectly.

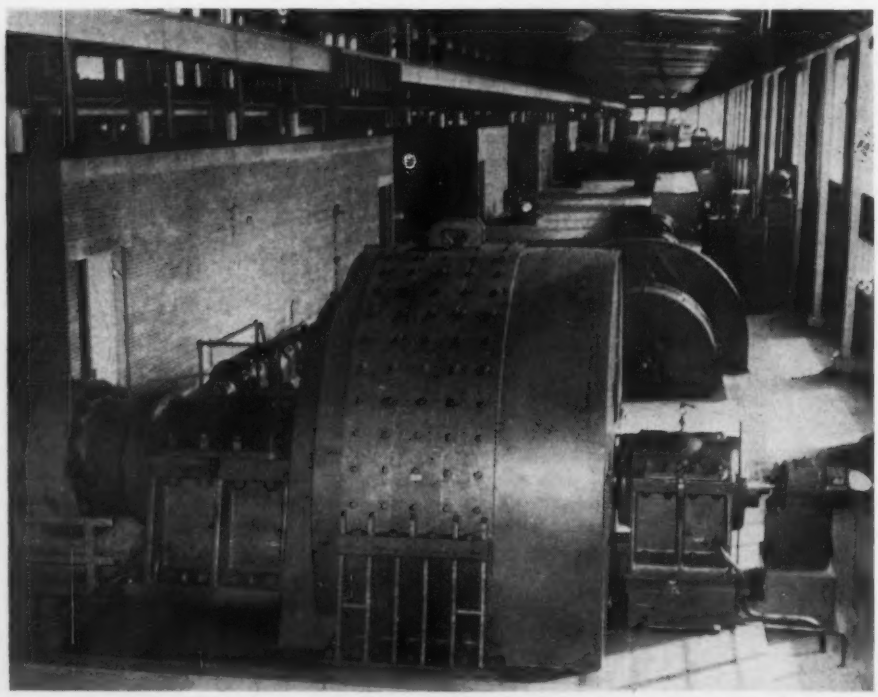
Aluminum's Most Modern Rolling Mill

Trentwood plant near Spokane embodies features new to aluminum rolling mills. New type electric drives, amplidyne control, switchgear and distribution systems—all engineered for high-speed, low-cost production

E. M. Johnson
Engineer, General Electric Co., Seattle



An 8,400-hp., 6,600-volt synchronous motor (center) drives two 3,000-kw., 600-volt d-c generators supplying power to 4,000-hp. motors that drive stands in hot finishing mill. Bottom—5,000-hp., 750-volt d-c motor driving reversing roughing rolls in hot mill No. 1. 4,000-kw. flywheel m-g set for this motor may be seen in background. Control houses shown at left



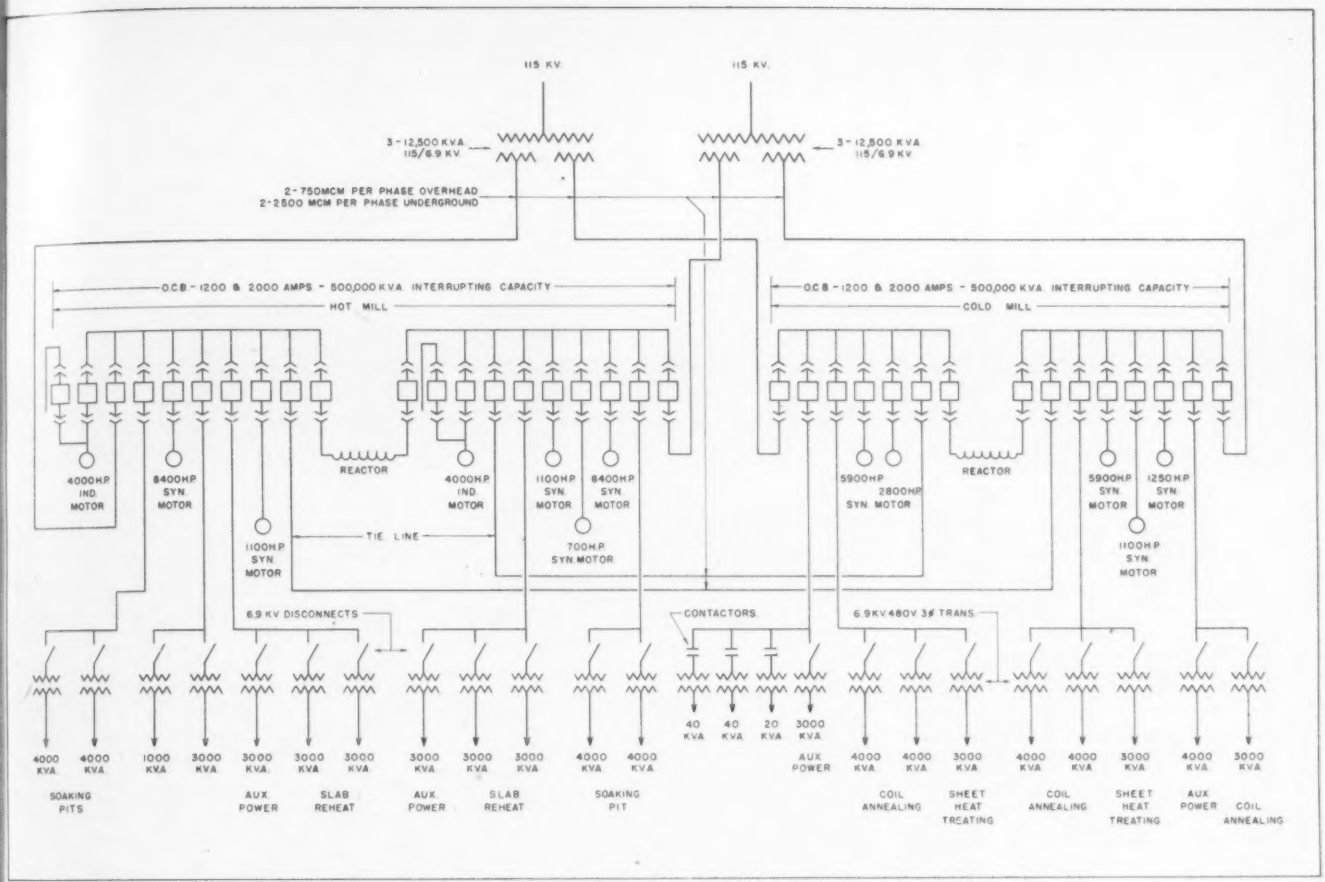
ONE of the West's most interesting war-built industrial plants, and another of those given little publicity because of wartime restrictions, is the Trentwood aluminum rolling mill located 12 miles east of Spokane. The plant was started in April 1942, and the first carload of aluminum sheet produced entirely there was shipped April 26, 1943—a remarkable record considering the size of the project and the shortage of materials encountered at the time construction was in progress. To cover in detail the electrical construction of an aluminum rolling mill of this size would require several articles. Therefore, this article will confine itself to high spots and some of the most important electrical features.

On any large construction project, one of the first essential requirements is a temporary source of power. A 69-kv. transmission line just outside the site provided an ideal source of such power, by merely installing a 500-kva., 69/2.3-kv. substation adjacent to the plant. From this was supplied temporary lighting, water pumps, power tools and arc welders. A temporary motor generator set was also installed to supply 250 volts d-c to operate cranes during construction.

Distribution System

In a plant having a capacity of 75,000 kva., switchgear and distribution assume major proportions. A one-line diagram of the distribution system is shown in the accompanying drawing. The system consists of the main 115/6.9-kv. substation of 75,000-kva. capacity, shown in an accompanying view, and two 6.9-kv., 480-volt indoor substations in the mill, one located in the hot mill, and the other in the cold mill. These substations, one of which is shown, are fed from the 115-kv. station by four 6.9-kv. overhead transmission lines.

The original plan had been to distribute power through underground cables. However, this was abandoned because of the acute shortage of copper which existed at that time. Two 2,500,000-cir.-mil conductors per phase would have been required for under-



Single-line diagram of main power distribution system, Trentwood rolling mill. Note the main transformers and bus connections to insure reliability

ground distribution. By going to overhead lines this was reduced to two 750,000-cir.-mil conductors per phase, so this change resulted in an appreciable saving in copper.

Because of the wartime shortage of steel, it was necessary to use wooden construction on all of the transmission towers. The angle towers were of selected Douglas fir reinforced with steel tie rods and bolted to concrete foundations. A typical angle tower is shown in one of the photographs. In the background are shown several tangent towers. The towers were assembled completely on the ground, including insulators, and were then erected by the use of a crawler crane. Lines were dead-ended on towers similar to one shown. At these towers the circuits go underground in koreduct to the metal-clad switchgear. The underground cable is lead covered, varnished cambric, single-conductor, 15-kv. insulation, 2,500,000 cir.-mil, terminating in single-conductor potheads on the towers and in the switchgear.

The four 6.9-kv. distribution lines and the two tie lines between the 6.9-kv. substations are protected by overcurrent and pilot wire relays, as well as by lightning arresters to provide the necessary high degree of reliability. Control wires between substations were installed underground, using control cable suitable for burying directly in the ground.

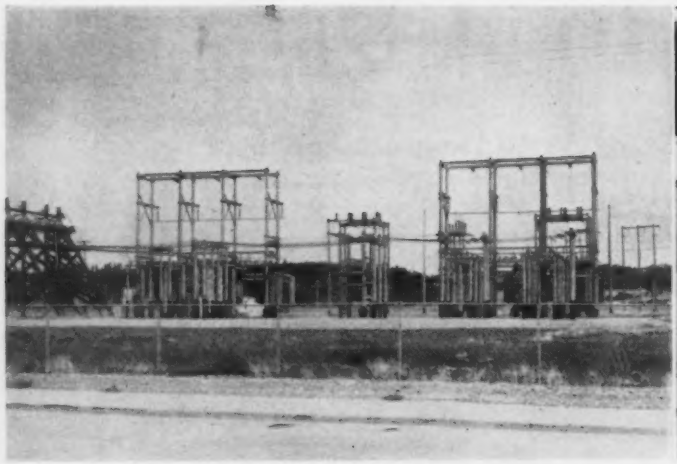
The hot mill metal-clad switchgear contains 18 drawout breaker units, while in the cold mill substation there are 15 drawout units of the same type. Oil circuit breakers are rated 1,200 and 2,000 amp., with an interrupting capacity of 500,000 kva. Installation work in the hot mill consisted of providing the complete main drive for two reversing hot mills and a five-stand tandem mill, together with all electric auxiliaries.

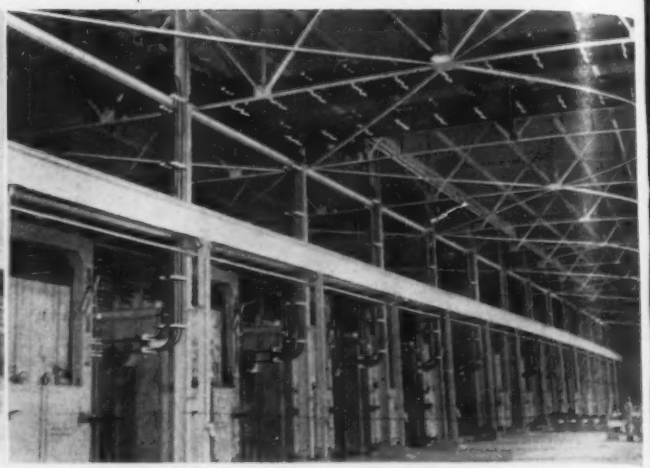
Hot mill No. 1 is driven by a 5,000-hp., 750-volt d-c, 30/60-r.p.m. motor, capable of taking occasionally applied momentary loads of 275% and frequently applied momentary loads of 225% at base speed. It drives a 36-in. and 54-in. x 120-in. four-high reversing roughing mill. The 750-volt d-c power for this motor is supplied by a 4,000-kw. flywheel motor generator set, driven by a 4,000-hp. wound rotor induction motor. Variable resistance for smoothing out the line current demands of the motor is obtained by using a liquid slip regulator as the external resistance in the wound rotor circuit.

For high peak loads the slip regulator inserts resistance in the rotor of the motor allowing the flywheel to give up its energy to the system. When the momentary peak loads due to rolling are over, the regulator reduces the resistance in the motor rotor, speeding it up and again storing energy in the flywheel. The steel plate flywheel has a stored energy of 142,500 hp.-seconds at 514 r.p.m. The 5,000-hp. reversing motor driving the No. 1 hot mill is shown in one of the accompanying photographs. The 4,000-kw. flywheel motor generator set can be seen in the background.

One of the installation problems encountered with this motor was that of assembling the armature on the shaft in the field. Together they weighed just under 100 tons. The armature and spider were heated by placing them in an insulated box containing about 18 kw. of electric resistance heaters. An accurate record of the winding temperatures was kept by placing thermocouples on the winding and connecting these to a strip chart recording instrument. Cooling the shaft with dry ice while the rotor was heated gave plenty of clearance for assembly, even though there were several thousandths of an inch shrink fit on these two parts.

The main drive motor, edger motor, and motor generator set all have forced-air cooling with surface air coolers. Bearings are all sleeve, ring-oiled with supplementary forced oil circulation. The motor room basement contains the ventilating and cooling equipment for the motors and generators, as all of the main drive motors,





Main substation (left) consisting of two 37,500-kva. transformer banks fed by two incoming 115-kv. lines. Total capacity is 75,000 kva. Right—One of the two interior transformer stations that serve hot and cold rolling mills

motor generator sets and auxiliary motor generator sets have forced-air cooling and surface air coolers. Space is also provided there for running the cables and buses in open racks as shown. The cables shown are the feeders from the 6.9-kv. metal-clad switchgear which is located just above in the motor room.

The control houses which contain the control for the reversing motors and the runout tables can be seen to the left in the photograph of the 5,000-hp. reversing rougher motor.

One of the problems associated directly with the hot mills was the installation of transformers, switchgear and feeders for the electric furnaces. At the head of the hot mill line are located the soaking pits requiring 16,000 kva. of transformer capacity. This power is supplied by four 4,000-kva., three-phase, 6,900/480-volt transformers. The low-voltage switchgear consists of 600-volt, 6,000-amp. air breakers. Some of the 480-volt cable feeders are shown. These are 1,500,000-cir.-mil, 600-volt cable risers up to the overhead channel bus from which the power is distributed to the soaking pit furnaces.

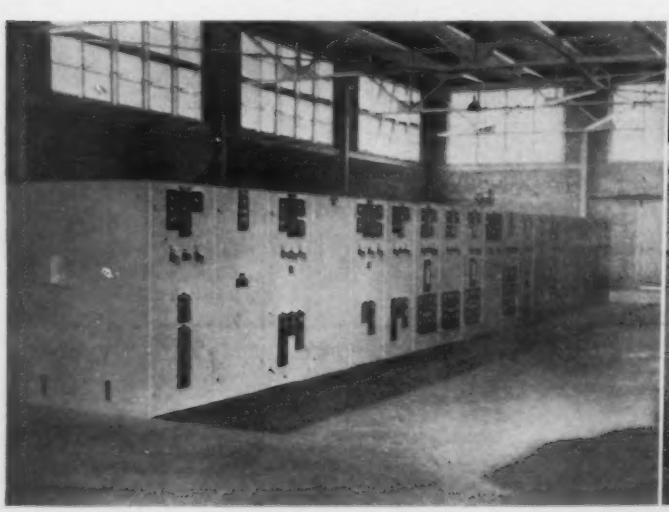
The slab-reheat furnaces are located between hot mill No. 1 and hot mill No. 2 and require 12,000 kva. of transformer capacity, consisting of four 3,000-kva., three-phase, 6,900/480-volt transformers. Auxiliary power in the plant is distributed by overhead feeders of the type shown. Such feeders provide 480-volt, three-phase, and 250-volt d-c power throughout the plant. The 480-volt, three-phase power is distributed through 480-volt metal-clad switchgear using air circuit breakers. The 250-volt d-c auxiliary power is furnished by three 750-kw., 250-volt motor generator sets and distributed through d-c high-speed air breakers.

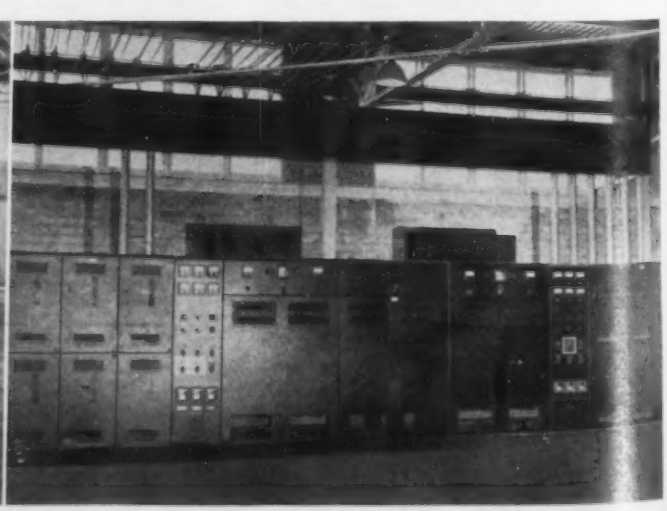
Hot mill No. 2 is similar to No. 1, except that the motor is rated 5,000 hp., 40/80 r.p.m., making it slightly smaller in physical size than the motor on the No. 1 mill. This motor drives a 28-in. and 54-in x 112-in. four-high reversing hot finishing mill. The next hot mill in the line is a five-stand continuous hot finishing mill. This mill requires a large concentration of driving power. The first four stands are each driven by a 4,000-hp., 175/350-r.p.m., 600-volt d-c motor, while the fifth stand is driven by a 2,250-hp., 250/550-r.p.m., 600-volt d-c motor. Power for these five motors is furnished by two 6,000-kw., 600-volt, d-c motor generator sets. Each set, one of which is shown, consists of two 3,000-kw. generators driven by an 8,400-hp., 6,600-volt synchronous motor.

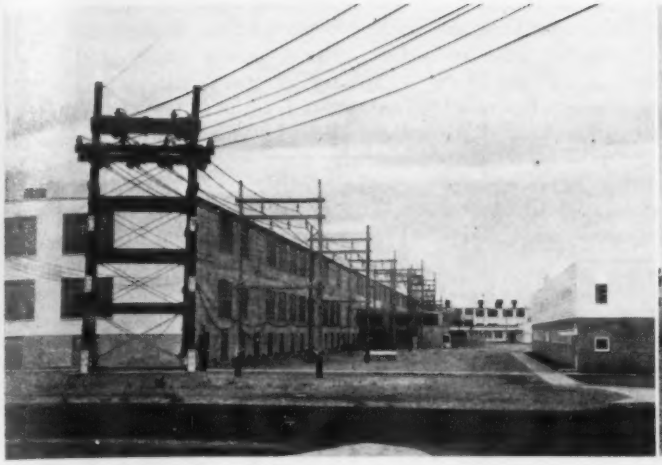
Metal-clad switchgear was used throughout. The 6,900-volt oil circuit breakers are rated 1,200 amp. and 2,000 amp., with 500,000-kva. interrupting capacity. Air breakers were used on all of the 480-volt circuits

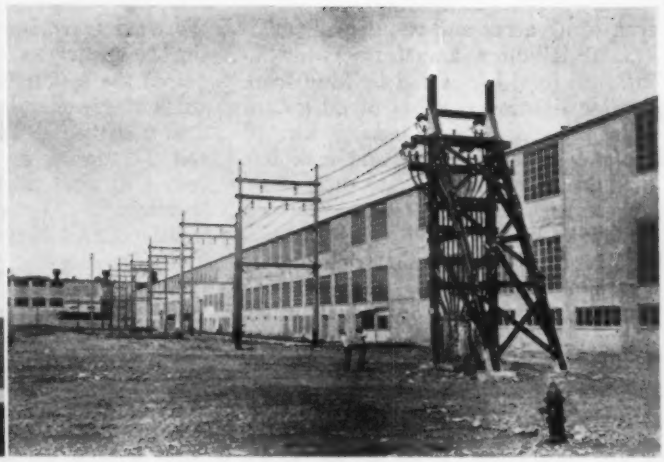
Each of the rolls on the reversing runout tables in the hot mill line is driven by an individual d-c motor. The entire hot mill line requires more than 500 motors, varying in size from ¾ to 25 hp. Each is wired through a protective breaker mounted in an individual cabinet. The runout tables are made up of several sections with each section individually controlled. Adjacent to the reversing mills, these tables are reversible and operate in conjunction with the mill. Table sections have variable voltage control and are synchronized to the operation of the main mill motor through a pilot exciter direct connected to the main mill motor.

Following each of the two reversing









Steel shortage made necessary the use of wooden structures. Shown at left is a typical steel reinforced wood angle tower carrying two 6.9-kv. circuits. Right: Type of dead-end and cable riser structure used on 6.9-kv. lines

hot mills are hot shears, one 3-in. shear and one 1½-in. shear, which are powered by d-c motors. At the end of the hot mill line is located a shear, an upcoiler and a flying shear.

The cold mills are preceded by annealing furnaces which prepare the coiled aluminum for rolling on the cold mills. Here again the furnaces are electric and require four 4,000-kva. transformers. Electrical installation is similar to that at the soaking pits.

The cold mills consist of one two-stand mill and two single-stand mills. Main driving motors on all of these stands are 2,250-hp., 250/550-r.p.m., 600-volt d-c. The 600-volt d-c for the two-stand mill is supplied from a 4,000-kw. motor generator set driven by a 5,900-hp., 514-r.p.m., 6,600-volt, synchronous motor. The No. 2 cold mill is largely the same, except that only one stand is now installed with provision for the future addition of the second stand, thus making it a duplicate of the No. 1 mill. The No. 3 mill is a single-stand mill requiring only a 2,000-kw. motor generator set. Each of the three motor generator sets has a 200-kw. direct connected generator to supply d-c power for the reel and upcoiler motors.

A large number of battery operated trucks are used throughout the plant.

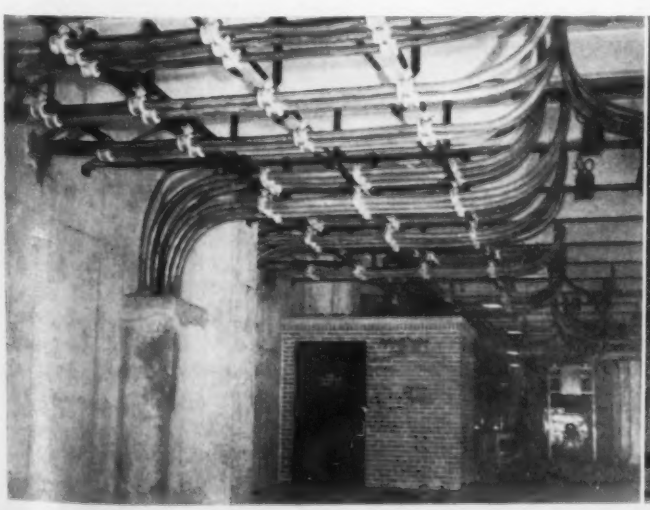
Charging equipment includes four 75-kw. motor generator sets with provision for adding two more in the future or an ultimate capacity of 450 kw.

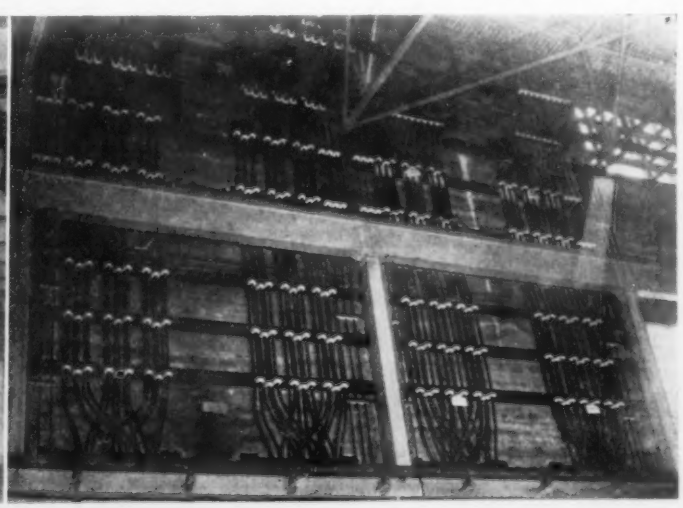
The mill is provided with three "scalping" machines which are essentially large milling machines used to "scalp" the aluminum ingots before they are rolled into sheets. These machines have an end milling cutter containing 44 tungsten carbide tipped tools that can take a sizable cut from the flat side of an ingot at a feed rate of 180 in. per minute. This cutter is driven by a 500-hp. induction motor.

There are 19 amplidyne generators used in the following different applications: voltage regulation, power factor regulation, motor field control, liquid slip regulator control, and tension reel control. These amplidynes range in size from 375 watts to 5 kw. The amplidyne plays a very important part in this installation. The amplidyne, of course, is a special d-c machine where the use of an ingenious method of connecting its armature and field circuits results in exceptionally high speed of response and low control power requirements.

It is interesting to note that the use of the amplidynes on the reversing mills entirely eliminates the use of large contactors on the reversing mill controls. Instead of a large group of contactors making and breaking sizable currents on each reversal, a few small relays used to excite the amplidyne fields provide split second and accurate control of the huge motors. The current is limited to a safe value on the motors by the current limit, but at the same time is brought up to this value in the shortest possible time and automatically held there by the amplidyne control to give the extremely short reversal times obtained on these motors. A few watts of control power applied to the amplidyne fields accurately control thousands of amperes on the main mill motor. A main drive motor draws currents up to 15,000 amp. on occasionally repeated loads.

Manner of installing open lead cables (left). These are feeders from 6.9-kv. metal-clad switchgear located in motor room above. Right: Type of installation used for 480-volt circuits feeding soaking pits and other equipment





The overhead lighting covers an area of 57 acres and requires fifty 75-kva. distribution transformers or 3,750-kva. total connected lighting load. Outside lighting consists of 80 kw. of series fence lighting and 20 kw. of series roadway lighting and complete yard and parking lot lighting.

A large pumping plant located on the banks of the Spokane River, having four 400-hp. induction motor-driven pumps and two 200-hp. fire pumps, furnishes the necessary water for plant operation. The mill has 47 overhead traveling cranes, ranging in size from five to 80 tons. These required the installation of a total of ten miles of crane rails. There were more than a thousand 440-volt a-c and 250-volt d-c motors in the mill to be connected up and placed in service. Approximately 20 carloads of fibre and metal conduit were used for the installation.

More than 1,500,000 ft. of No. 12 stranded control cable were installed. The overhead lighting required over 500,000 ft. of No. 8 insulated cable. Low-voltage power cable used on the job, varying from No. 6 up to 1,500,000 cir.-mil, totaled more than 400,000 ft. The 15-kw., 2,500,000-cir.-mil, leaded, single-conductor, varnished cambric cable used totaled 16,000 ft.

The entire electrical installation at Trentwood was handled under contract by the General Electric Co., under the direct supervision of J. F. Spease, Northwest district engineer, Portland.

High-Frequency Heating Armchair Survey

A realistic brass tacks philosophy on possibilities of high-frequency heating, with a power company's sales plan for going after this business. Crystal gazing mistakes following World War I will not be repeated

George N. Hawley

Manager of Industrial Sales, Southern California Edison Co.

IN the middle twenties the electrical industry got a bug in its bonnet about electric heat. It was based upon the greatly increased utilization of electricity for heating processes during World War I and the realization that, of the total energy used in manufacturing, electricity accounted for less than 10%. The problem seemed simple; by picking off 10% of the business of competitive fuels, electric utilities could double their kilowatt-hour sales to industry. The wise men of the business calculated that not more than ten years would be required to complete the transition provided the utilities would speed the reduction of industrial rates so as to make electric heating competitive.

That was *two wars* ago. In the intervening years the progress of electrifying industry's heating processes has gone steadily forward. Heating engineers of utilities and manufacturers, fortified by the interest of their managements, made material strides in electric melting and heat treating of metals and considerable progress in other directions. By 1929 kilowatt-hour sales to industry had increased 36% over 1919. Relatively, however, the growth was slow. By 1929, with a 17% increase in total energy consumed by industry, electricity's share had risen only to 10½%. By 1939 only 12.7% of the total was in electricity's column. That does not tell the whole story for in the meantime the entire complexion of industry's heat balance had changed considerably. Fig. 1 details these shifts in energy consumption. Here all forms of energy are reduced to equivalent tons of bituminous coal so that direct comparisons can be made. The decline in the importance of bituminous coal and the simultaneous rise in the relative usage of the more easily applied fuels, petroleum products, natural gas and electricity, is apparent. It must be recognized, however, that a substantial portion of the electric increase represents motive power, rather than heating applications. The noteworthy thing is the tremendous increase in the use of high-grade fuels. Electricity's increase is quite nominal in comparison.

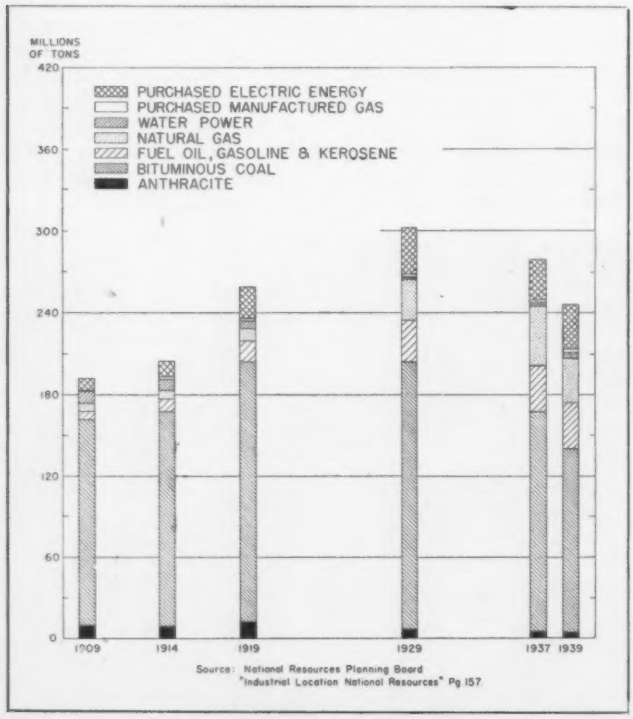


Fig. 1—Energy consumed in industry in terms of bituminous coal or equivalent (plotted from Table 1) showing relative usage of electric power and various fuels during 1909-39

Reviewing the progress up to 1939, it must be conceded that the electrical industry failed in realizing its plan. It failed for one major reason; a lack of understanding that *for the great majority of heating applications there is no such thing as a competitive electric rate.* Many existing heating jobs in industry simply cannot be done by electricity at any rate. In those cases where electric heat has proven eminently successful, it is because of peculiar advantages of the apparatus or process which make the energy decidedly secondary. It may be said that electric heat as such does not compete with fuels. The competition is between entire methods of production. This is not to belittle the magnificent job done by the industry in promoting electric heat. Rather, it is to point out that the planned objective was not reached simply because of faulty conception of the goal.

Failure to realize the nature of the competition is responsible for the statistics previously quoted. Time and

Table I—Energy Consumption in Manufacturing Industries, 1909-39, Bituminous Coal or Equivalent

Quantities in Thousands of Tons

	1909		1914		1919		1929		1937		1939	
	Quantity	%	Quantity	%	Quantity	%	Quantity	%	Quantity	%	Quantity	%
Anthracite	14,202	7.4	13,730	6.7	13,436	5.2	9,334	3.1	6,419	2.3	4,907	2.0
Bituminous coal	151,205	78.2	154,283	75.8	188,233	73.4	196,780	65.5	162,961	58.4	137,771	56.0
Fuel oil, gasoline, and kerosene	4,895	2.5	7,413	3.6	15,284	6.0	30,190	10.0	31,168	11.1	30,607	12.5
Natural gas	5,765	3.0	6,918	3.4	8,602	3.3	27,613	9.2	40,805	14.6	36,190	14.7
Water power (plant owned)	9,497	4.9	7,949	3.9	6,237	2.4	3,118	1.0	2,922	1.1	2,910	1.2
Purchased manufactured gas	1,038	.5	1,300	.6	1,518	.6	2,083	.7	2,207	.8	2,289	.9
Purchased electric energy	6,843	3.5	12,159	6.0	23,248	9.1	31,586	10.5	32,836	11.7	31,303	12.7
Total	193,445	100.0	203,752	100.0	256,558	100.0	300,704	100.0	279,318	100.0	245,977	100.0
Tons per wage earner	39.2		40.1		40.6		39.0		37.2		37.4	

Table II—Potential Sales of High-Frequency Heating Equipment

Southern California Edison Co. System,
Connected Load of Apparatus Sales in hp.

Class	Major Industry Groups	Total Present Connected Load 1,000's hp. All Uses	Immediate Potential hp.	Possible Applications hp.	Ultimate Total hp.	Immediate Potential in % of Present Connected Load
1	Food and kindred products	69	520	1,500	2,020	.8
2	Tobacco manufactures*	...	...	...	...	...
3	Textile mill products and other fibre manufacturers	7	...	...	...	...
4	Apparel and other finished products made from fabrics and similar materials	1	140	...	140	14.0
5	Lumber and timber basic products	24	...	...	...	...
6	Furniture and finished lumber products	15	760	1,000	1,760	5.1
7	Paper and allied products	16	...	1,000	1,000	...
8	Printing, publishing and allied industries	2	...	...	...	...
9	Chemicals and allied products	95	2,300	4,000	6,300	2.4
10	Products of petroleum and coal	200**	...	5,000	5,000	...
11	Rubber products	50	...	6,500	6,500	...
12	Leather and leather products*	...	...	...	...	...
13	Stone, clay and glass products	78	...	...	...	...
14	Iron and steel and their products except machinery	240	6,200	...	6,200	2.6
15	Non-ferrous metals and their products	89	3,125	...	3,125	3.5
16	Electrical machinery	8	...	...	...	...
17	Machinery (except electrical)	62	2,380	3,000	5,380	3.8
18	Automobiles and automobile equipment	40	1,220	1,500	2,720	3.0
19	Transportation equipment, except automobiles	164	1,030	2,500	3,530	.6
20	Miscellaneous (including motion picture production)	40	...	...	...	...
		1,200	17,675	26,000	43,675	1.5

* Negligible
**Including production and pipe line

again, electric heating engineers have adapted fuel fired equipment to electricity, sold the advantages of clean heat under close control only to have the application slip back to fuel as the gas and oil men improved their apparatus. An outstanding example of this occurred in the automobile industry, where at one time practically all baking and drying of paints and enamels was done in electrically heated ovens. Those ovens that remain are now heated by fuel and this business is now on its second cycle, spurred by the revolutionary application of electric heat by direct radiation from infrared lamps, without any "oven" at all! This is our second chance at this job and it is evident that we have profited by the mistakes of the past.

This rather lengthy preamble was felt necessary before digging into the real topic of this discussion. The correction of misconceptions regarding the competitive status of electricity for heating has been long overdue. *High-frequency heating needs to be treated not as a competitive heat source but as a production tool.* Industry doesn't care whether the thing is heated by electricity or peanut hulls, so long as it speeds production, cuts costs and turns out a better product. If we promote its use, we will not be competing with so many B.t.u.'s developed from oil or gas or hay. We shall be selling a new production method.

As far as industry is concerned, World War II is washed up. With the sagging of industrial loads, utility men are dusting off their ouija boards and sweating out answers to management's prime question, "What can we promote to replace our wartime sales to industry?" High-frequency heating received a shot in the arm during the war that boosted it right onto the production line. It is natural, therefore, that studies of its peacetime potentialities should engage the attention of utilities and manufacturers alike as one of the new sales possibilities. In many respects the situation is much like that which prevailed after the end of the first World War. In one important respect, however, it is greatly different. We know a whale of a lot more about how to judge our markets than we did before.

In southern California where, before lend-lease, industry was still in its diapers, the problem of projecting sales possibilities in high-frequency heating is doubly difficult. A realistic approach to the problem we felt should avoid mass comparisons of B.t.u. equivalents and tackle the job by pointing up applications on an industry by industry basis. We wanted to get a line on the ultimate as well as the immediate possibilities, that is, those applications in industry that looked like good bets for the future, as well as those for which apparatus had already been developed. Personal visits to each of our

2,000 major industrial plants would have been out of the question, so we did the next best thing. We used sampling.

From the list of 448 separate classifications of manufacturers as given in the U. S. Census of Manufactures, we selected 74 which seemed to hold some promise for the use of high-frequency heating. We had intended to visit one typical plant in each category, make a flow sheet of the operation and from that estimate the application possibilities. We found, however, that in many cases our power salesmen already had a good idea of what went on in typical plants. From our customer records we determined the number of plants in each of the 74 categories and from this and our typical plant possibility, made our estimate for each industry. This material was later recapped into the 20 over-all classifications used by the Census of Manufactures. This method is rough and ready but we are satisfied that it presents as good a picture of the possibilities in southern California as can be had without the expenditure of prodigious amounts of time and money. We feel also that this method is a better approach than the questionnaire method, when it is considered that we are dealing with brand new devices whose features and merits are not well known in industry.

The recap of sales possibilities is shown in Table II. For comparison, an estimate of our present connected power load in each industry group is given. It is to be expected that high-frequency heating possibilities would amount to only a fraction of our present power loads. Realism demands that we look not too far into the future in judging capabilities, in view of the present state of the high-frequency art.

A brief resume of some of the applications proposed will serve to amplify the data in Table II. In Class 1, food and kindred products, applications included sterilization of cereal products and the pasteurization of beer, both of which have been successfully developed. In Class 4, apparel, we put the curing of nylon products, now under consideration. Class 6, furniture and finished lumber, shows projected loads in the bonding of veneer and plywood products. In Class 9, chemicals, the loads anticipated are largely in curing plastics and synthetics. Class 14, iron and steel products, showed the best prospects for immediate possibilities. The loads are largely heat-treating, annealing and heating for forming. Class 15, non-ferrous metals, includes heating for wire and tube drawing and extrusion and for melting of primary metals. Class 17, machinery, is largely heat-treating of oil well tools and machinery. Class 18, automobiles, is largely heating and heat-treating of auto accessories such as bumpers and springs. This class was a little disappointing to us as practically no primary manufacture of automobile engines and chassis is carried on here. Class 19, transportation equipment, includes airplane manufacture. Successful applications are already used in bonding laminated wood parts by two of our plants. This class also includes boatbuilding in which plywood bonding and plastic preforming methods are expected to be used.

Some of the possible applications which look like good bets but which so far have not been developed have been included in the "possible" column. Dielectric heating for curing of rubber products ought to be successful. We expect it to be applied first in the production of mechanical rubber goods and later hope to break into the tire business. Likewise, glass melting ought to be a natural for induction heating. This development probably will be slow in coming and equipment costs will probably rule it out except for the largest plants. We feel that it is a distinct possibility, however, and should be included. In the petroleum industry we expect to see induction heating used in connection with special processing and in the production of chemical bases and intermediates. We may wait a long while to see the full development of this but it merits inclusion in our possibilities.

All things considered, we believe our survey to be conservative and realistic. We are convinced that high-frequency heating merits a substantial place in our sales program and expect to do our part in promoting it soundly. At the same time, we have to put the customer's interest first and promote only well-developed applications.

The time required to realize the major portion of these sales possibilities is, of course, also difficult to predict. Frankly, we do not expect the active phase of selling to get under way before another 12 months have elapsed. Our experience with industrial markets indicates that selling proceeds along a curve of diminishing returns. The best applications are picked off first and the going gets tougher as the program progresses. We are conservative enough also to discount entirely the non-developed applications in setting up our sales quotas. Accordingly, for the first of active promotion our sales quota will not exceed 20% of the immediate possibilities, or about 3,500 hp. of new connected load.

Estimated annual revenue from high-frequency applications will approximate $15 per hp. according to our best judgment, putting these applications about on a par with other average industrial loads. Manufacturers representatives call this estimate ultraconservative. If it turns out to be higher—that's fine; for the present we're setting our sights on the conservative side.

Our plans for promoting sales in this new field may be of interest. We expect that promotion will go through three well-defined stages. The first stage involves stimulation of broad general interest on the part of industrial consumers. In this stage we plan to hold a high-frequency conference in Los Angeles this fall under the sponsorship of the local chapter of the American Society for Metals. This will be similar to the conferences previously held in Chicago and Detroit which proved so successful. Experts from the ranks of both equipment manufacturers and local users will participate in the program and demonstrations of typical operations will be given. Our object here is to acquaint as many potential users as possible with the merits of the method and to stimulate the attention of local industrial circles. We expect considerable local publicity as a result of the conference.

The second phase involves development of applications at the local level. Here we expect to receive a great deal of help from equipment manufacturers in actually processing many of our customers products. Most of the manufacturers have realized that peacetime applications of high-frequency heating will be considerably different and more varied than those during the war. Relatively, only a few types of applications have thus far been made. Peacetime possibilities should exceed in scope and amount the development during the war.

The third stage may be called the active selling phase. Proceeding from well-developed applications resulting from Stage 2, we will attempt to sell high-frequency heating as a production tool. Not till then can we say that we are really in business in this field. Our sales methods will be the same as those which have previously proved successful in our general power sales programs, that of utilizing the services of some 40 power salesmen with one or two specialists in the general office. We shall try as far as possible not to treat high-frequency heating as an odd or specially difficult device. There is no reason why it cannot be made as simple in customers minds as a machine tool or a welder. To accomplish this we are incorporating into our power sales training program a considerable amount of material on this very important subject.

This in general is our idea of markets and sales plans on this new development. *Our grandsons may be selling atomic energy at so much per pill, but in the meantime we'll push high-frequency heating—it looks good and it's ready to go.*

High-Frequency Heating Clinic

West Coast has new testing laboratory available to industry and utilities where practicability of high frequency for solution of heating and processing problems may be determined

E. W. Morris
Westinghouse Electric Corp., Los Angeles

TO aid electric utilities of the West and their industrial customers in determining whether high-frequency heating, induction or dielectric, is the solution to any given industrial heating problem and for use in developing new applications for this production too, Westinghouse has opened a new Western laboratory, completely equipped to study such problems. Known as the Westinghouse Pacific Coast High-Frequency Laboratory, the new study center occupies the ground floor at the Los Angeles headquarters building. The company's area sales, engineering, manufacturing and repair departments are located in the same building, making the facilities and personnel of all these departments readily available to the laboratory when and if needed.

In charge of the new facilities is Dr. Russell A. Nielsen, formerly of the Westinghouse Research Laboratories at East Pittsburgh, Pa., and a staff of engineers.

Equipment which permits the detailed study of a wide range of high-frequency heating problems has been installed. A complete shop facilitates setting up of any desired type of problem. Modern testing and measuring devices permit quick and accurate determination of results attained in the laboratory studies and experiments.

Inspecting one of the two 10-kw. tubes in a 20-kw., 450-kilocycle industrial high-frequency generator in the new high-frequency heating laboratory

Among new units installed in the laboratory is a 20-kw. industrial radio frequency generator for induction heating, or the heating of materials, largely metals, which are good conductors of electricity. With this machine, the engineers will investigate such industrial heating problems as the surface hardening of gears, shafts, tools and cylinders; brazing; soldering of cans, bushings and so on; heating for forging; melting of high-quality metal alloys; annealing of metal tubing and sheet, and the many problems in heat treating. This generator operates at a frequency of 450 kilocycles, well below the familiar commercial broadcasting band.

Effectiveness of induction heating in those tasks for which it is suited is readily apparent. The maximum rate of energy transfer from the walls of a furnace maintained at 2,000° F. to a body at room temperature is only about 3 B.t.u.'s per minute per square inch. By induction heating, energy can be transferred to a piece of steel from 100 to 200 times faster with no difficulty, or at the high rate of 300 to 600 B.t.u.'s per minute per square inch.

Also installed for laboratory use is a 5-kw. industrial radio frequency generator for dielectric heating, or the heating of materials which are poor conductors or non-conductors of electricity. With this generator may be studied tasks such as the heating and softening of plastic preforms prior to molding; the bonding of plywoods and plastic laminates; the glueing of furni-

Dr. Russell A. Nielsen (left), in charge of the laboratory, shows how the cutting edges of triangular steel blades for agricultural mowers are hardened by induction heating. Right—Determining the time required for glue to set on a one-kilowatt radio frequency generator. This is only one of numerous problems that will be studied

New Pacific Coast high-frequency laboratory provides facilities where power companies and industrials may work out their electronic heating problems

ture, and many, many other problems. Other possibilities still admittedly in the experimental stage can and will be studied there when time permits. These include such jobs as the curing of rubber; treating of rayon and nylon; drying of food, wood and ceramics; sterilization of grain and packaged food products, and so on. The 5-kw. unit operates at a frequency of either five or 30 megacycles—5,000,000 or 30,000,000 cycles per second.

In addition, and available for use in the laboratory when and if needed, is a one-kilowatt demonstration radio frequency generator which may be used for either dielectric or induction heating studies, as required.

Benefits to Utilities

During the war, many industrial users of electrical energy have called upon electric utility engineers to assist in solution of some industrial heating problems. Some of those problems have been of such nature that their solution could most readily be found through the use of high-frequency heating equipment. One of the fundamental purposes of the new laboratory is to help the utility engineer to aid his customers in determining whether or not high-frequency heating may be the answer to his problem.

In general, high-frequency generating equipment is an extremely good load. In a high rate production process, the duty cycle and therefore the load factor is high. The power factor of vacuum tube generating equipment runs well above 90%. High-frequency heating, therefore, is an excellent utility system load builder.

Economic Factors

The cost of high-frequency heating will depend on the cost of power used plus the direct operating cost, maintenance, and amortization of the equipment. All these factors considered, the final cost to the user might run from two to four cents per kilowatt-hour of high-frequency energy output. High-frequency heating, however, either induction or dielectric, becomes economical by virtue of one or more of the following factors:

1. It produces a result not possible by other methods of heating.
2. By increasing the speed of a process, it results in saving of labor or over-all equipment costs.
3. It reduces over-all power consumption because it delivers the heat, or confines the heating, to the part or point where the heat is wanted.
4. It is a clean, compact method.
5. It improves the production quality of a product, and reduces rejects.
6. It is flexible in its application to a wide variety of products, processes and operations.

High-frequency heating is sound and economical if it can lower the manufacturing cost per piece or if it can result in a better product at the same cost. It is most economically sound when it is involved in a high rate production process, since the initial cost of the equipment is not reflected in a high depreciation cost per manufactured part. It is *not* economical when it is applied indiscriminately to processes that could best be accomplished by other means.

It behooves the manufacturer, the utility and the user of high-frequency heating equipment to investigate each application to determine economic factors involved. This is one of the primary purposes of the new Westinghouse high-frequency laboratory which, we believe, will provide a place where all industries in the West can obtain qualitative and quantitative data on the possible application of high-frequency heating to their own processes.

Testing and measuring devices for determining success of high-frequency-heating application to a particular problem are part of clinic equipment

Log Barkers Portend New Era

Developments in hydraulic log barking and new processes for greater utilization of timber resources bring changing power picture and mean more business for the electrical industry

J. H. Pestalozzi
Allis-Chalmers Mfg. Co., San Francisco

Top—Typical scene left by loggers. Conservation of timber resources will demand that the present 40% waste in logging operations be utilized for pulpboards and many other products

TIMBER once was one of the natural resources in which America was abundantly rich. For many decades past we have drawn freely upon the millions of acres of timber land with little heed for the day when the great stands of virgin timber will have been logged off. Little cognizance has been taken of replacement through reforestation or of ways of converting a higher percentage of trees into marketable products.

It may surprise many to know that at the present time only 60% of a timber stand is actually brought into the sawmill or pulp mill. For reasons of economical handling and transporting, the remaining 40% is left on the logging site and must be burned over to eliminate the dangers of forest fires. Subsequent breakdown methods, either in the sawmill or pulp mill, reduce the net yield by an additional 20%. It has been estimated that on the basis of our present rate of consumption our virgin resources, now confined almost entirely to the Pacific Northwest, will be depleted within 70 to 80 years.

Through the cooperation of private owners in conjunction with government and state forestry departments, widespread interest has been created in conservation. Methods are being studied whereby the 40% of formerly wasted timber can be recovered. Logged over areas are cared for and replanted, and new means are sought to reduce the amount of waste occurring in the breakdown processes for both lumber and pulp.

The breakdown method in the pulp mill used to be a costly and laborious process. The final product in the form of clean chips ready for the digester has to be free of bark or other foreign matter to eliminate a discoloration in the various grades of paper. This is particularly true of the sulphite process but is now looked upon with ever increasing interest also by the craft or sulphate mills. In years past, many methods to remove bark or other foreign matter have been used, resulting in a waste of good wood fibre of up to 25%, thus giving a net yield of only 35 to 40% of a timber stand. Logs were broken down into either two- or four-foot pieces, split and then freed of bark by means of rotary knife cutters, with each piece handled separately.

Newer methods were conceived and experimented with until some years past the Weyerhaeuser Timber Co. approved experimentation at its Everett plant to remove bark by means of a high-velocity water jet. Paralleling these efforts, the Allis-Chalmers Mfg. Co., when approached by some of the eastern pulp mills, also began to experiment on hydraulic barking. The depletion of timber resources in the eastern portion of this country were so striking that a saving of even 15% in wood fibre would pay large dividends.

Hydraulic barking of the larger Western logs was a somewhat different problem from that of the much smaller eastern logs, so that the designs incorporating the feasible handling of these contrasting types of logs had to be pursued along different lines. These experiments established the basic fact, however, that bark could be removed by means of a high-velocity hydraulic jet, and its application in the pulp industry promised a saving in both raw materials and labor.

In the early inception of hydraulic log barking, experiments were made with varying pressures and quantities of water. The Weyerhaeuser company, for instance, decided upon a pressure of 1,000 lb. and 800 g.p.m. for its first commercial installation at Everett. This barker, shown in one of the accompanying photographs, was designed to handle logs up to 25 ft. in length having diameters ranging from 10 in. up to five or six feet. The carriage, to which two nozzles are attached, is passed longitudinally underneath the log and the log is indexed or turned as the bark is removed. High-pressure hose is used to provide the necessary flexible connection between the reciprocating carriage and the stationary pump header.

Allis-Chalmers, in their experiments, found that a pressure of 650 p.s.i. and 600 g.p.m. would suffice for eastern wood. Since it was desired to bark logs either 4 ft. or 8 ft. long, ranging from 4 in. up to 18 in. in diameter, this machine was designed to rotate the log under the jet, at the same time causing it to advance by means of a spiral feedroll. To date, about 20 of these smaller log barkers, as illustrated, are in successful operation at eastern mills.

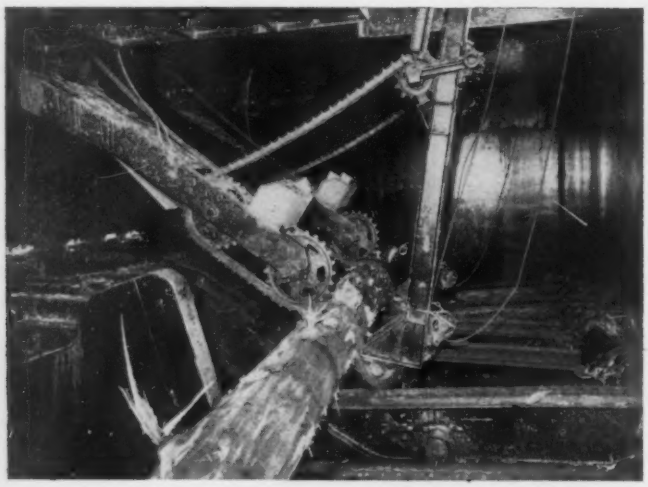
Sometime after Weyerhaeuser placed its first commercial machine in operation, the Crown-Zellerbach Co. designed a hydraulic log barking machine which was placed in operation at Port Townsend, Wash. This machine was designed for a pressure of 650 p.s.i. and 500 g.p.m. In this design the logs are chucked between centers, as shown, and the barking nozzle is passed over the log which can be rotated like a wood lathe at the desired speed. Several machines of this type have been built and are now in operation, using pressures ranging from 1,000 to 1,100 lb. and quantities of water ranging from 400 to 600 g.p.m.

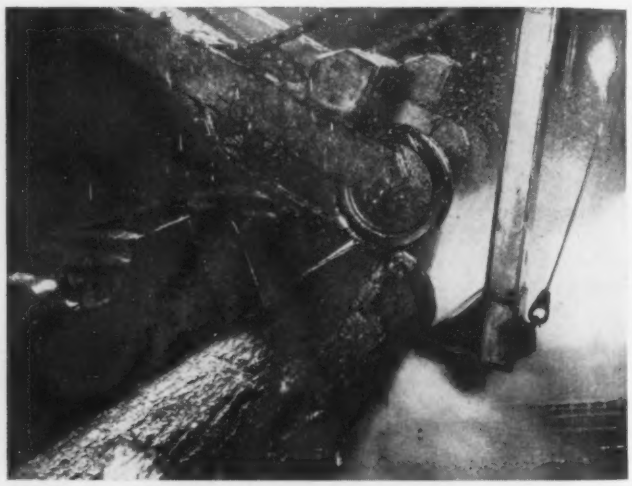
From the description of these machines, it may be seen that bark can be successfully removed with pressures ranging from 650 to 1,400 lb. and with quantities of water ranging from 400 to 1,000 g.p.m. The range in power required to drive pumps for these conditions is 350 to 1,000 h.p., which represents a fairly large percentage of load for any one plant. While definite information as to pressure, quantity and barking speed and their relation to one another is not yet available, it is presently conceded that pressures ranging around 1,000 lb. should be used on Western wood, while from 650 to 700 lb. suffices in the East.

Further evidence of thought given to wood conservation by many of the pulp mills is the recovery of sawmill slabs. These slabs, the same as round logs, have to be freed from bark and other foreign matter to make them suitable for pulp manufacturing. For this reason, several of the leading pulp companies have constructed machines to debark slabs. Pumping requirements are similar to those of whole log barking.

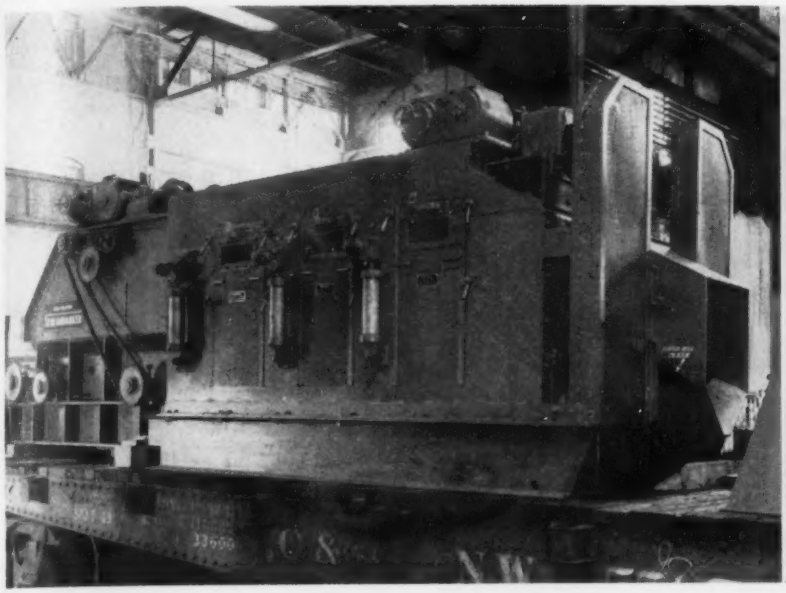
The foregoing discussion has pointed out savings accomplished by log barking for pulp mills only. Considerable thought is being given at this time to barking sawmill logs. While a saving of from 15 to 25% of previous costs of manufacturing pulp can be expected in that industry, the barking of sawmill logs will pay very much smaller dividends. It is therefore necessary that operating costs and capital investments be kept at a minimum. Advantages which can be cited in favor of barking sawmill logs are, for instance, the recovery of bark-free slabs which can without any further processing be passed on to the pulp mills. There also will be a distinct advantage to the sawyer in selecting the manner in which a log is cut after the bark has been removed. The number of saw changes will be fewer with barked logs than is the case at present because of the presence of abrasive matter imbedded in the bark. It is estimated that a saving of from 2 to 3% can be effected by barking logs for the sawmill industry. The writer's company is at the present time engaged in doing research along these lines and it may well be that in the not too distant future a design will be completed to satisfy the needs of both the pulp and sawmill industries on the Pacific Coast.

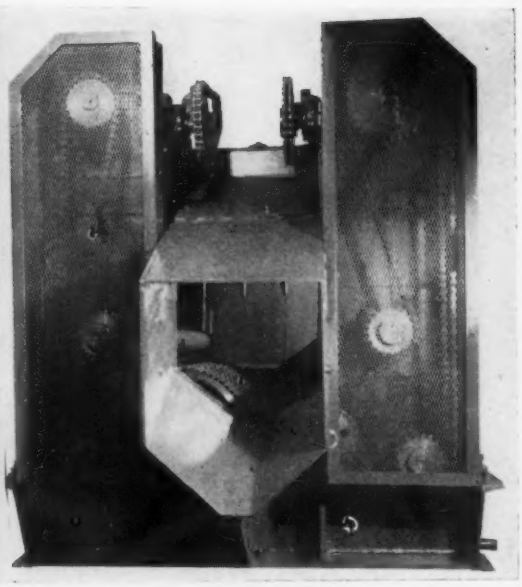
Considerable interest has also been displayed by piling manufacturers, who





One of the first log barkers to be used in the Pacific Northwest was this machine developed by Weyerhaeuser Lumber Co. in use at the Everett mill. Barking is performed by two traveling nozzles shooting water jets under 1,400 lb. pressure against the underside of the log. Logs up to six feet in diameter and twenty-six feet long may be handled. A seven-stage centrifugal pump, driven by a 1,000-hp., 3,600 r.p.m. motor, supplies the water





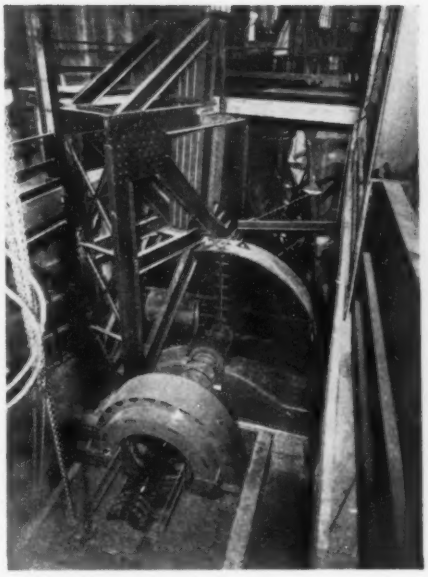
at the present time use costly hand labor for removing bark from poles. A suitably designed hydraulic log barker will undoubtedly show considerable savings also in that industry.

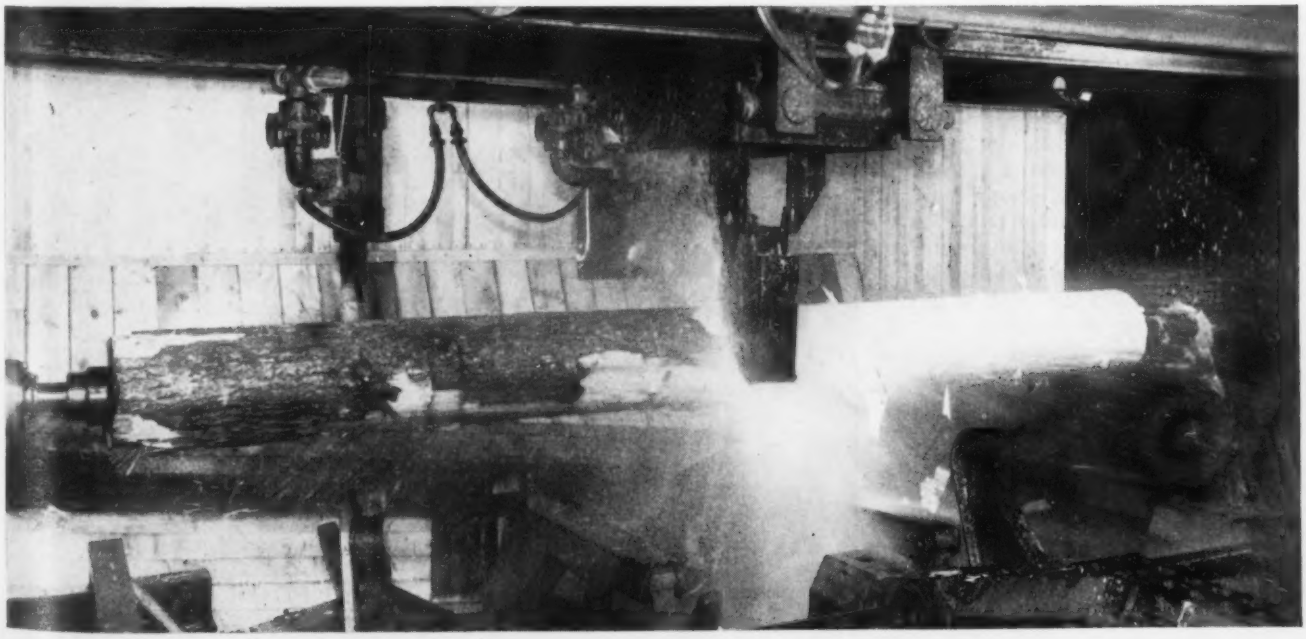
Taking a long-term viewpoint of the timber industry as it relates to the manufacture of pulp, it is expected that large developments will be forthcoming in this field. To substantiate this, we need only point to some of the more recent developments, such as plastic impregnated pulp siding or paneling, molded pulp forms for various uses, and many other materials made from wood fibre. If further, we consider the method of breakdown, it is apparent that, the smaller the logs become, the more advantageous it would be to break them down completely into wood fibre rather than to saw them into lumber. This is because of the increased cost of handling a greater number of pieces and the

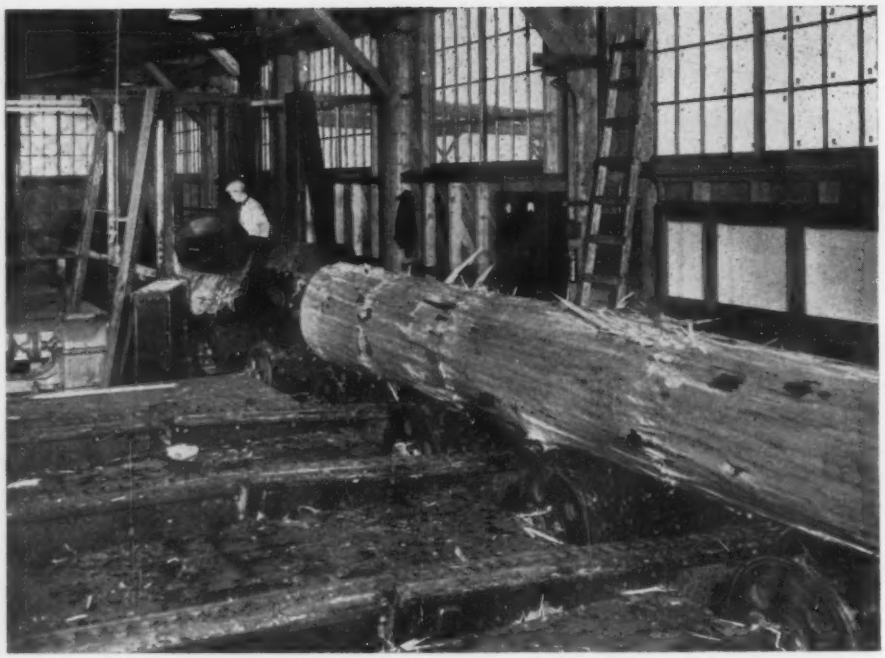
Hydraulic log barker (top left) built by Allis-Chalmers for the smaller and shorter eastern logs. Large Western logs require a different type barker. Right—End view of a-c stream-barker showing one of the rolls for turning log

Whole-log chipper (right center) takes logs up to 3 ft. in diameter. Four knife pockets take knives 50 in. long, 1 in. thick and 8 in. wide. Chipper is driven by 1,000 hp. wound rotor motor

One of the several successful types of hydraulic log barkers in operation in the Northwest pulp industry is lathe type barker below, developed by Crown-Zellerbach. Logs are kneed-up into position and automatically centered in an immense wood lathe-like machine. Carriage for nozzle is synchronized with drive motor and travels parallel along the length of the log. Water pressure through the nozzle is 1,100 lb. supplied by a 450-hp. motor







Barked logs are cut into sections and fed into whole-log chipper. On-end section of log feeding down into chipper can be seen in front of the man

higher percentage of waste such as saw kerf and slabs. Smaller logs will obviously be more prevalent as the virgin growth timber is depleted.

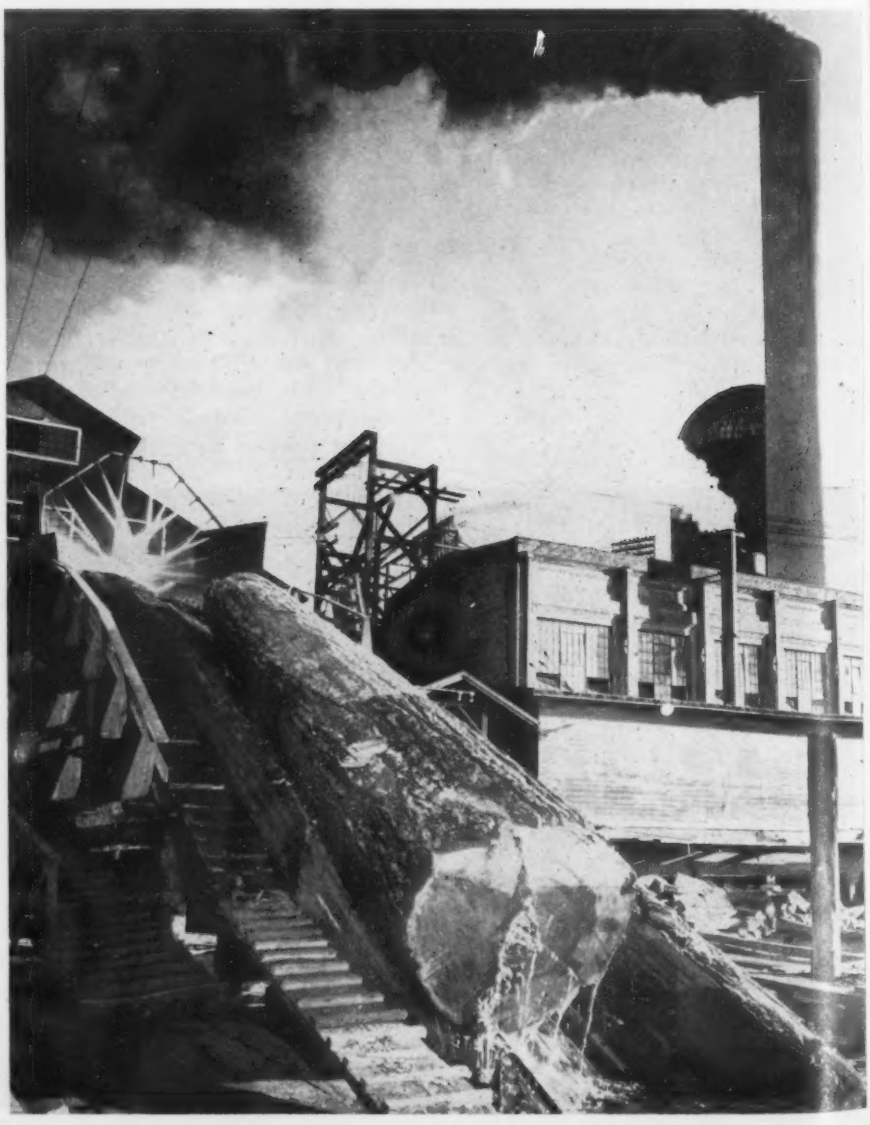
Changing Power Picture

It can therefore be expected that, with the changes taking place in the pulp industry and the trend toward conservation throughout the lumber business, the whole power picture in these industries will likewise undergo change. It is interesting to look back for a moment on the sawmill industry in particular. It was customary for time immemorial to utilize sawmill refuse under boilers for power requirements of the mill, sell the slab for firewood, and burn the excess in incinerators. Then came the central station industry as a market for part of the excess in the form of hog fuel. In fact, steam-electric generation in the Northwest until recent years was almost exclusively from hog fuel.

Then the sawmill industry saw a market in the form of sawdust burners for house heating and quite a thriving business developed. Although there are thousands of house heating sawdust burners still in use, they are on their way out because mill refuse is becoming scarcer and the price is going up. As a matter of fact, the day is nearly at hand when conversion of the forest into usable products will become so complete that the mills themselves cannot afford to burn wood in any form for power generation. Just at present the pulp mills and sawmills find themselves in the position of having less and less refuse, and at the same time power demands are going up because of log barkers and other machinery for reducing waste, plus the requirements of processes for making plywoods, pulpwoods and other marketable products.

What do all these evolutionary changes portend for the light and power industry? They mean that the wood processing industries are rapidly going from a self-sufficient power producer, with power to "burn", to one where there will be little or no power production, with complete usage of purchased power. The central station industry is fully cognizant of these things and already many large mills are tied in with power companies on a give and take basis.

It is a long-range transition, but the factors are surely at work. It means that electrical energy and electrical equipment are becoming basic in the wood industries—not supplemental.



Log haul and wash for removing small stones and other foreign material from bark before log enters head-rig. This reduces maintenance of headsaw

Sawmill Modernized Electrically

Outgrown outmoded oil circuit breakers, switchboard and distribution system give way to modern metal-clad switchgear, high-voltage feeders and unit load centers in Weyerhaeuser mill

K. L. Watts
Weyerhaeuser Timber Co., Everett, Wash.

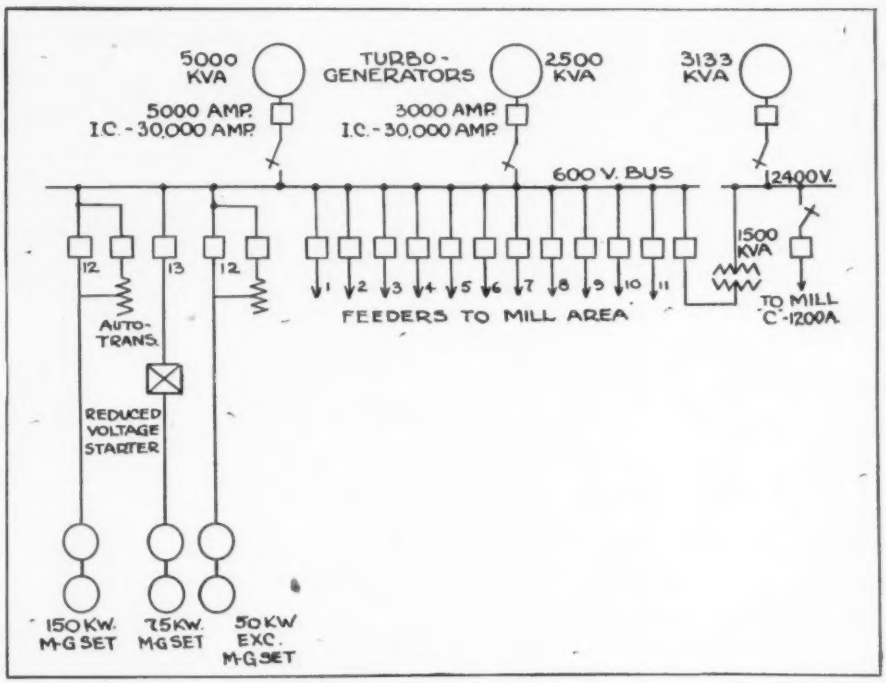
THE Weyerhaeuser Timber Co. operates a large lumber mill, known as Mill B, on the Scohomish River at Everett, Wash. This mill converts logs, which are floated down the river from the forest, into finished lumber. It has been in operation since 1915 and the original installation has been enlarged and changed considerably until the output now is 750,000 board feet of fir lumber per day.

Electric motors are used for powering saws and other machinery throughout the plant. Power for this mill and another one nearby is generated by three steam turbine generator sets, one of 5,000 kva., one of 3,133 kva. and a third of 2,500 kva., totaling 10,600 kva. Waste wood is used for fuel in the boilers.

The existing power distribution system had become obsolete and was unsatisfactory for several reasons. The original switchgear was of open type construction and the crowding of the equipment because of additions from time to time had made the switchroom very congested and unsafe. The congested conditions are clearly illustrated in accompanying photographs.

Increase in the connected generating capacity had over a period of years increased the available short-circuit current on the system, so that the short-circuit duty on the breakers was several times their interrupting rating. This was of considerable concern to us, as it can be readily seen what damage would be done to the switchboard should one of the oil circuit breakers blow up when attempting to open a very heavy short circuit. If an oil fire had resulted from the failure of one of these breakers, it easily could have destroyed a major portion of the switchboard.

Although we had never had any real severe short circuits, we were aware of the potential danger from this standpoint. The available short-circuit current on the 600-volt system was over 100,000 amp., whereas the 600-volt oil



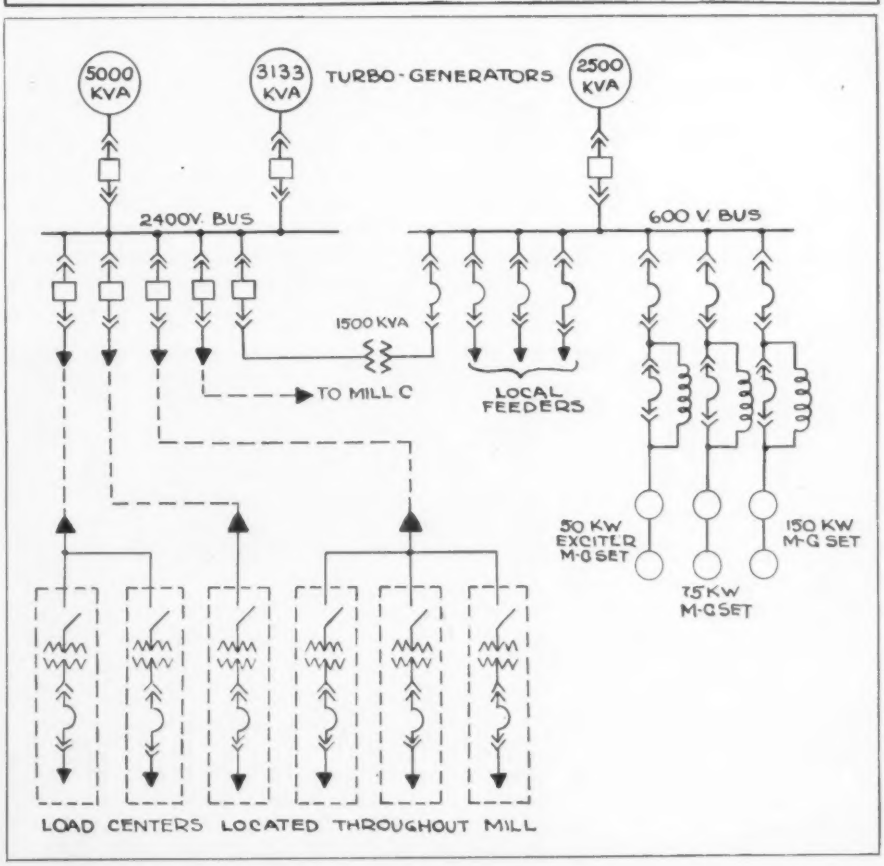
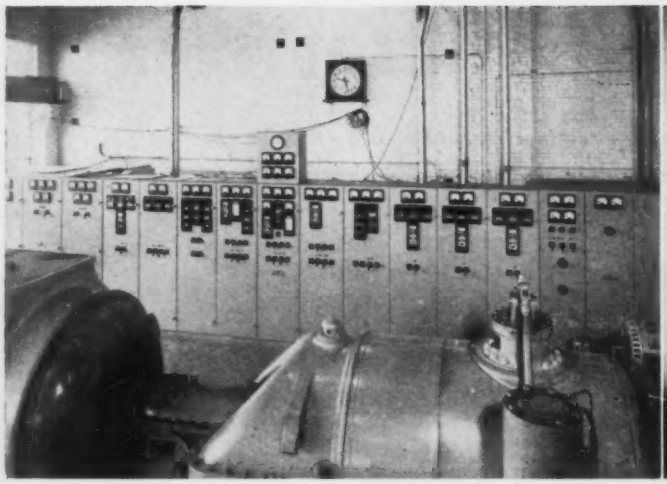
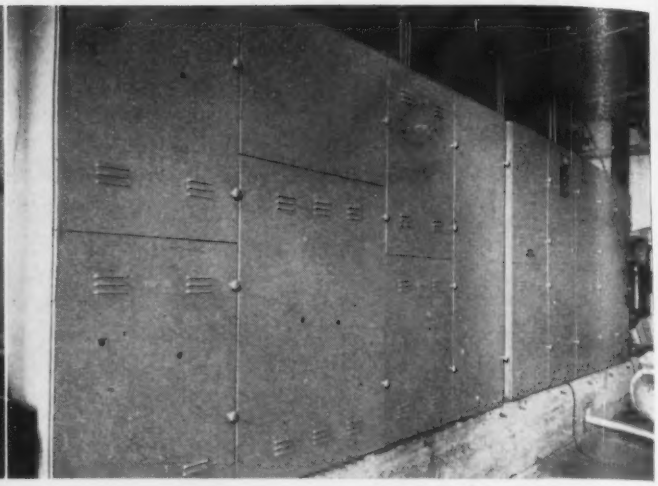


Fig. 1 (above)—Original bus, switch and feeder layout. Fig. 2 (below)—Modernized system with load center distribution and metal-clad switchgear





At left, new 2,400-volt metal-clad switchgear power house. Right—Control for new 2,400-volt switchgear is centralized at this panel on the floor below switchgear. New breakers have interrupting capacity of 150,000 kva.

circuit breakers had only about 20,000-amp. interrupting capacity. While the modernization of this equipment was being studied, one of the main oil circuit breakers did fail, resulting in a plant shutdown of more than 24 hours.

The old 600-volt system, because of its long, heavy feeders, had high copper losses and high voltage drop. It was desirable to correct these conditions also.

The original switchgear layout is shown in Fig. 1. This switchgear was connected directly to the 5,000-kva. and the 2,500-kva. turbine generators and through a 1,500-kva. transformer to the 3,133-kva. generator. The latter generator was installed in recent years, primarily for supplying power to Mill C, about a quarter of a mile away, and to the 600-volt bus through the 1,500-kva. bus tie transformer.

Since the condition of the 600-volt switchgear was the most serious situation, two alternative plans of modernization were considered. The first was to merely replace the existing 600-volt open type switchgear and oil breakers with a new low-voltage air circuit breaker switchboard. This would have provided adequate short circuit protection, but it would not have corrected the excessive feeder losses and high voltage drop in the long low-voltage feeders. Also, expansion of the mill with the 600-volt system would have been very expensive. The cost of the new 600-volt switchgear would be about $85,000.

The second alternative for modernization of this plant included changing to higher voltage and using a load center distribution system in the mill. This alternative was selected and the one-line diagram of the load center system as installed is shown in Fig. 2. Total cost of the new metal-clad 2,400-volt switchgear, load center unit substations, and new 600-volt switchgear for the 2,500-kva. turbine at the power house was approximately $102,000. This figure includes $6,000 for material for rewinding the 5,000-kva. generator from 600 to 2,400 volts.

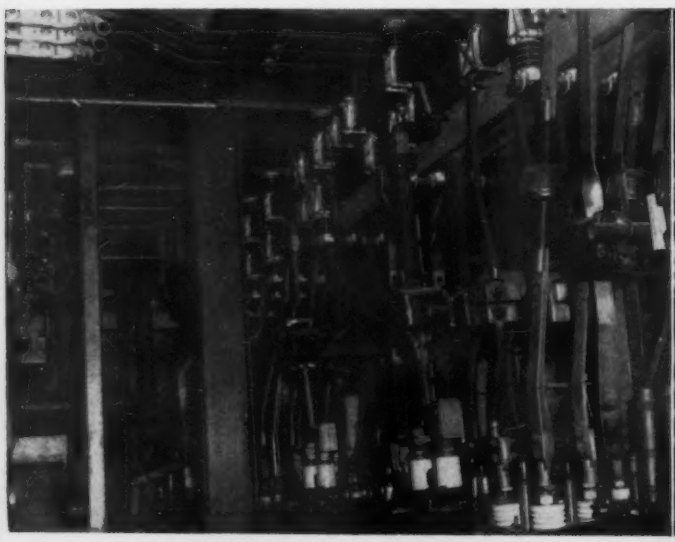
The change from 600- to 2,400-volt distribution not only will reduce the voltage drop and power loss in the feeders, but will also bring the short-circuit amperes, as well as the load amperes to values consistent with the ratings of moderate-size circuit breakers. Incidentally, there are several tons of feeder and bus copper which have been salvaged.

In the new load center system, it was deemed advisable to leave the 2,500-kva. turbine on a 600-volt bus in the power house to serve local 600-volt load in the neighborhood of the power house and to serve the three motor generator sets.

The existing 3,133-kva., 2,400-volt turbo generator has been connected to the new 2,400-volt bus and feeder 2, for Mill C, connected to that bus.

Since most of the load is remote from the power house, it was felt desirable to rewind the 5,000-kva. generator and place it on a 2,400-volt bus consisting of new General Electric

Rear view of old 600-volt switchboard (left). Note planks between bus bars to prevent bars from coming together under short circuit conditions. Right—View showing the congestion of cables at rear of old 600-volt switchboard



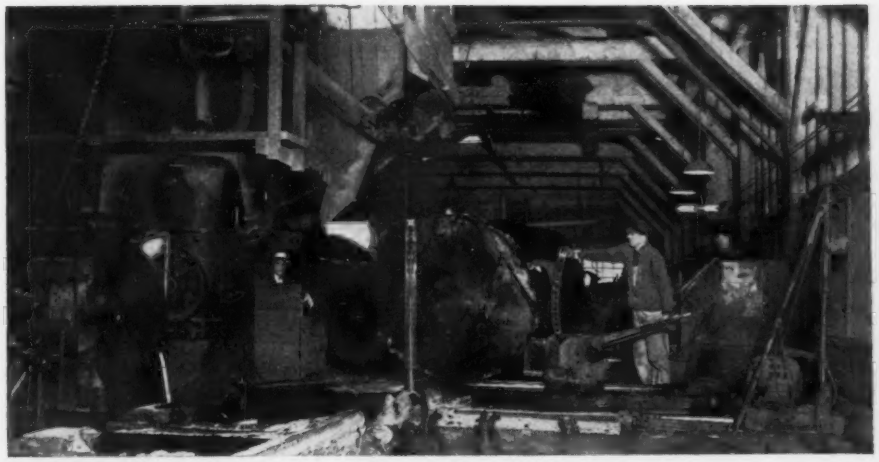
metal-clad switchgear with 150,000-kva. interrupting rating and duplex control board, so that the load at the more remote parts of the plant could be supplied over 2,400-volt feeders to unit substations located in the mill area where the power is stepped down to 600 volts.

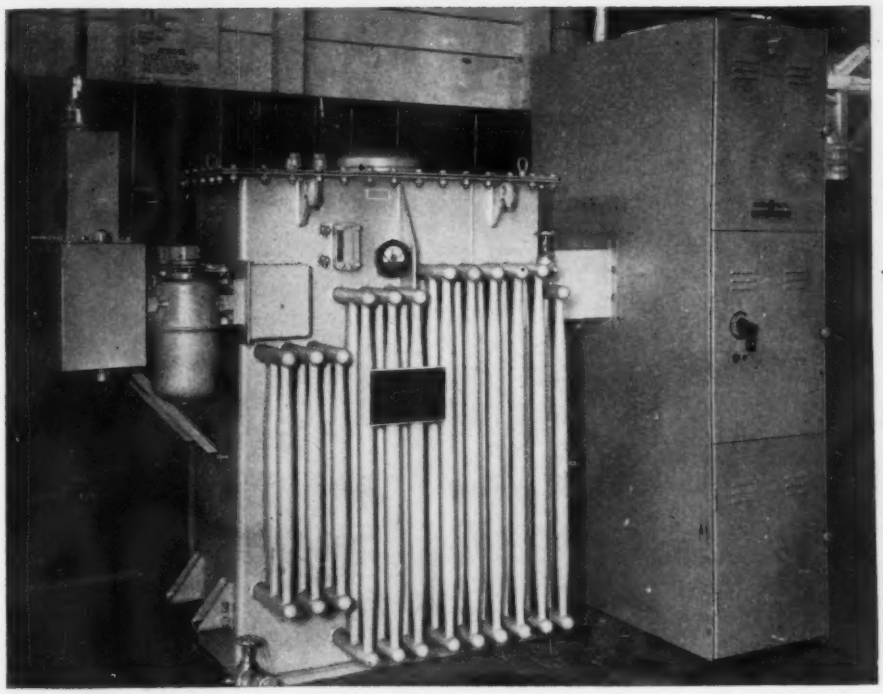
Because of the extra space in the slots of the 5,000-kva. generators, it was feasible to add more copper in the windings, and thereby increase its rating to 6,100 kva. Provisions were made when the turbine was built for extra rows of buckets. Hence rewinding the generator will give some extra power which is needed in this plant at the present time.

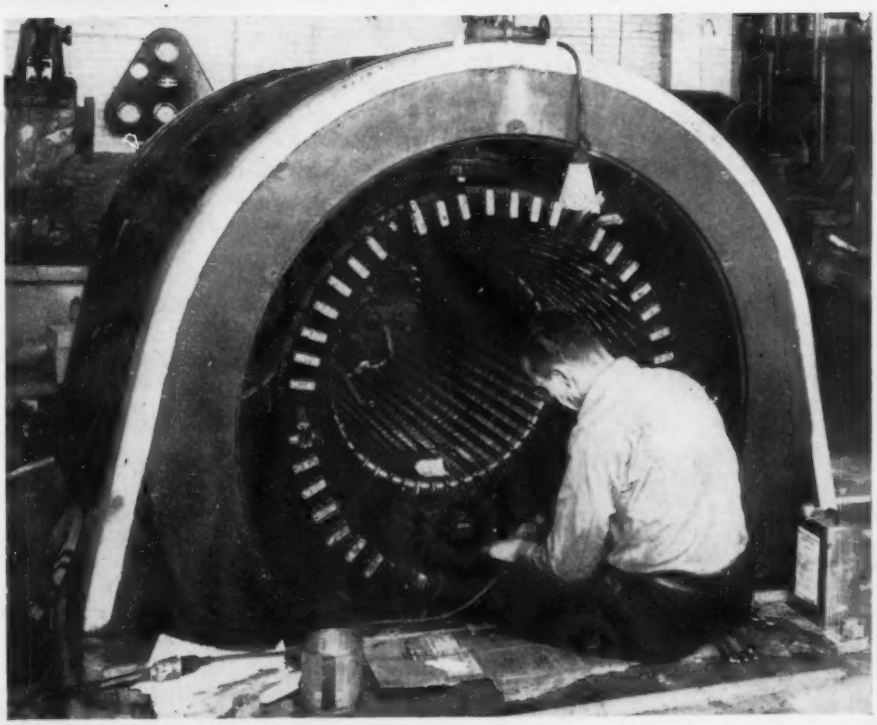
There are a total of six General Electric load center unit substations. Each substation consists of a three-phase high-voltage transformer with a junction box and a primary disconnecting switch, and a secondary switching section with one main secondary low-voltage drawout air circuit breaker. The substations are located indoors hence non-inflammable pyranol transformers were selected in place of conventional oil filled transformers. There will be 42 individually enclosed low-voltage air circuit breakers located remotely from the transformer which will protect branch circuits. The existing wiring in the mill was used and connected to these individual breakers. In this way, there was no change required in the mill wiring and there was no change required in the motors, controls, etc.

The complete change-over was carried out during the two-week shutdown for the vacation period in the first part of August 1945. No difficulties were experienced in making this change-over and all parts of the equipment went together easily and quickly.

This new system gives us a completely modern power system throughout our plant and has reduced the voltage drop and losses and relieved the congestion at the power house. The new equipment is considerably safer for the operating personnel than the older equipment was. These advantages were obtained for an expenditure of about $20,000 more than it would have cost to patch up the old system by merely adding a new 600-volt switchboard.







Top—Electric motors drive the 11-ft. single-cut band mill and other sawmill machinery. Center—Original long 600-volt feeder runs were brought into 1,000-kva. and 1,500-kva. pyranol load center unit substations, fed by new 2,400-volt feeders. Bad voltage conditions were eliminated, power loss reduced and large quantities of copper salvaged. Bottom — Rewinding the 5,000-kva. generator for 2,400 volts

Not Found in the Books About Welding

Second article which tells what was learned about demands, loads, fuses, wiring and equipment for factory production machine welding operation

C. A. Rowley
Electrical Engineer, Thermador Electrical and Manufacturing Co., Los Angeles

IN THE reconversion of plants from various kinds of war production to the making of civilian products many will turn to electric welding in its various forms for the fabrication of products made of metals. Therefore some of the lessons learned by a company which has made extensive use of welding in many ways may prove of value. If in nothing else, some idea of the kind of load it is, what provisions must be made to supply it, and how to wire for it, protect it and what may be expected of it in the way of diversity, should be worth knowing, for very little of it is yet to be found in books.

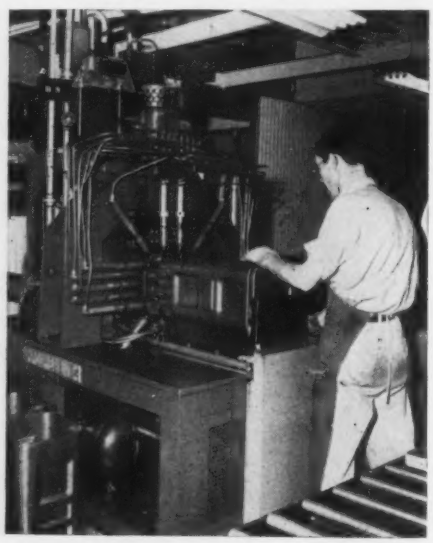
In a previous article, in the August issue, p. 77, the various types of welding equipment were described and something of the operation of each was explained. This article gives some of the practical "low down" of installing, operating and servicing such equipment. This is done not to criticize but to point to needed improvement which will benefit the manufacturers of equipment who pay heed to the suggestions, as well as to future users of their equipment.

Thermador Experiences

At the time of Pearl Harbor, engineers of this company knew next to nothing about electric welding. What they know today has been learned the hard way, largely by trial and error. In the interim the company has fabricated some 1,750,000 ammunition boxes, each requiring 243 individual welds, and upwards of 650,000 100-lb. practice bombs, each requiring 216 welds. From this rather extensive experience many things were learned not printed in books or otherwise available.

The company started tooling up for war work in the spring of 1942 and by midsummer received the first heavy-duty machine welder. It was a 200-kva. seam welder, operating at 460 volts, single phase, except for 1-hp., three-phase motor. There were no instructions relative to circuit conductors or service switches and the local factory representatives were totally ignorant on these points. This illustrates one of the problems needing to be worked on.

Now the company uses all of the best known processes, including arc, spot, seam, flash and projection or pressure welders. The total name plate capacity of all welders in the plant is 3,200 kva., ranging in size from 7½ kva. for the arc welders, up to 200 kva. each for some of the seam and pressure units. Except for the motor generator sets, all machines operate at 440 volts, single-phase, 50 cycle.



A 75-kva. hydromatic welder, rebuilt by Thermador into a 200-kva. unit to complete 18 welds in six seconds. Parts are jigged into position, 18 welds are made and the box leaves the machine in 14 seconds. Tips are water cooled

Of interest in connection with the mention of the substation capacity, it should be recorded at this point that in addition to the above welding load, the connected load includes 385 hp. in motors, 300 kva. in secondary transformers, and 322 kva. in infrared and bake oven equipment, making a total connected power load of 4,200 kva., in round numbers.

Using just common sense and judging from other experiences, the 30- and 40-kw. units were wired each on a separate 460-volt, single-phase circuit of No. 2 wire through a 200-amp. externally-operated switch, fused to full capacity. These machines were frequently moved from one part of the plant to another as need arose, occasioning constant rewiring and delay. Tiring of this process, the company finally declared these units "portable" and equipped them with three-wire, No. 2 Tyrex cords and 100-amp. Arktite plugs. The original No. 2 circuits were then extended to the several locations where frequent welding was done and at each point there were installed 100-amp., three-wire companion receptacles connected three or four to a circuit.

Circuit Protection

At the same time the old 200-amp., externally operated switches were replaced with 90-amp., tamperproof circuit breakers, thus giving perfect protection to the No. 2 circuit.

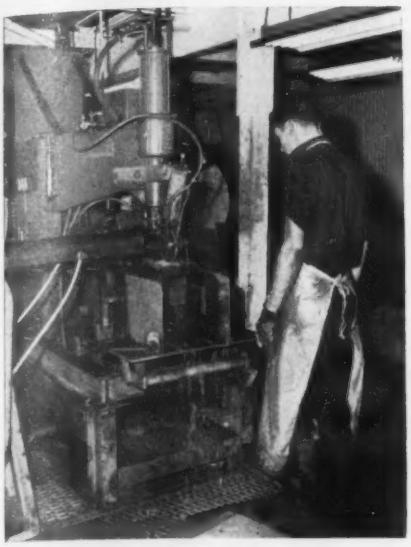
The three-wire cord provides automatic grounding, thus completely overcoming the rewiring problem.

According to the book we were not supposed to connect more than one unit at a time to these circuits; nevertheless, on several occasions we have had two 30s and a 40 so connected and operating continuously, day in and day out, without kicking out a breaker or developing undue heat.

In view of the perfect protection provided for both circuit wire and cord by the 90-amp., tamperproof breaker, the company feels no qualms of conscience over this practice, in spite of what the book says. In fact, it is felt very strongly that numerous changes in the Code are urgently needed to keep it abreast of sound practice, especially in regard to demand factor on short-duration loads of this character.

For some time it has been the practice of welder manufacturers to give their machines a name plate rating (based on a 50% use factor) as a guide for wiring. Since the practice started, inspection authorities have accepted this rating as a basis for wiring calculations, and most localities in southern California have agreed in substance on the following methods of figuring wire sizes:

1. *Single machines—circuit amperes.* "Multiply name plate kva. by 1,000 and divide by supply voltage." Thus for a 440-volt, single-phase, 40-kva.



Jig built by Thermador combines automatic feeding device and a 150-kva. seam welder, its wheel water cooled

unit the number of amperes to be wired for are $40 \times 1{,}000 + 440 = 90$. This calls for a No. 2, type R conductor for short and average runs. Long runs, involving considerable line voltage drop, must be increased accordingly.

2. *Grouped machines — feeder amperes.* "Add all name plate kva. ratings, multiply by 1,000 and divide by supply voltage." "Multiply resulting amperes by .80 and figure feeder size accordingly, allowing for length of run."

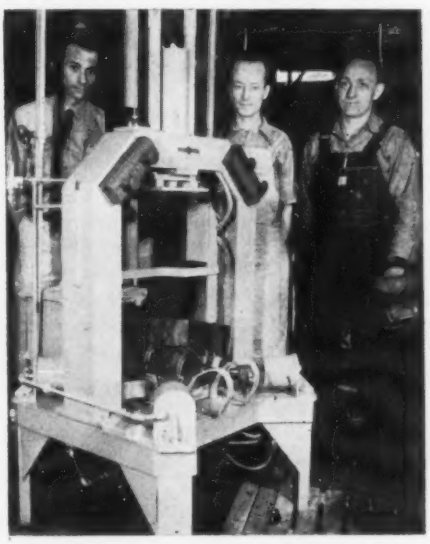
It will be noted that this method makes no allowance for power factor which in the case of most single-phase welders is around .50. The actual flow of primary current at the instant of weld is greatly in excess of the values as calculated above, but the time intervals between welds are so long that there is very little accumulative heating effect in the supply circuit, even with the heavy lagging current represented by the low power factor.

This bears out the theory behind the method described, namely, that a conductor selected to handle name plate current continuously will be ample for twice that amount of working current plus its wattless component when thus loaded only 50% (or less) of the time. The company made the entire installation on this basis and has had no trouble with either feeder or circuit conductors.

However, it is our belief that the .80 demand factor allowed for group feeders can be very liberally reduced in cases where spot welders only are involved, particularly if the feeders are protected with tamperproof devices as mentioned previously.

Another thing the company has learned is that where fuses are used on seam, flash and pressure welder circuits, they should be rated at least 100% over circuit continuous capacity. Even so they will open-circuit more often than breakers selected exactly to match the circuit rating. There are those who will argue this point but Thermador is so thoroughly convinced of its truth that another time it would use nothing but breaker protection.

It is well known that the latest National Electrical Code does not adequately cover the subject of welder wiring and protection. It is quite probable, however, that it will be brought up to date in its next revision. As evidence reference is made to the *Tentative Report on Electric Welding*, prepared by the technical subcommittee of the Electrical Committee and printed in the July 1943 News-Bulletin of the IAEI. The wiring recommendations therein are considerably more liberal than the rules quoted previously and, therefore, should, and undoubtedly will, receive the closest scrutiny of the Electrical Committee before being adopted into the Code.



A 75-kva. flash welder, both designed and constructed at Thermador plant

Tailor-Made Devices

Because it was not possible readily to purchase welders for special operations, Thermador has built several machines completely and has rebuilt at least two standard machines to meet special requirements. In addition, it has made and installed numerous aligning jigs, feeding devices and control attachments which have speeded up production tremendously. Many of these are illustrated in the accompanying photographs.

The flash welder, illustrated herein, has been in use three years. It has completed some 1,750,000 butt welds of 1⅞-in.-by-twelve-gauge steel stock, not one of which has failed in subsequent drawing operations which reduce the flat band to a bell-shaped section with a ½-in. double offset.

Another illustration shows the latest of the home-made units. It not only tack-welds the ¾-in. by-ten-gauge bottom reinforcing band in place, but also shapes and accurately locates it, thus combining the work of welder, break and jig and reducing the number of operators involved from three to one, not to mention doing a better job more rapidly.

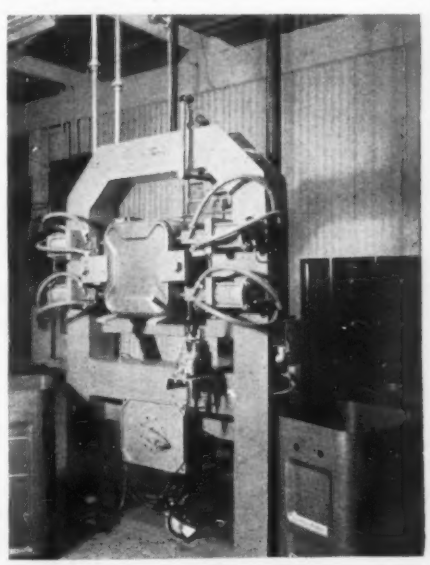
Another illustration shows a home-made, 50-kva. pressure welder and jig which efficiently holds the reinforced bottom in place while the four guns tack-weld it to the body of the 40-mm. shell box. This machine saves the time of two operators and requires no special skill to run.

Another picture shows how a standard motor-driven spot welder was converted into a most effective tack welder. The movable arm was secured in a fixed position and both welding points replaced with relatively small Malory metal wheels. By means of a simple cam wheel and micro-switch arrangement, the ignitrons fire at about 2-in. intervals as the longitudinal body seam of the 40-mm. box is drawn between the wheels. The jig and "Zee Bar" guide, which insures exact alignment throughout the operation, are also a product of the Thermador shops.

Another picture is interesting chiefly from the standpoint of the jig and guide carriage which pass the pretacked seam accurately and quickly through the weld wheels. The operator needs only to feed the work in and remove it. Incidentally, this 150-kva. welder operates through a time-controlled contactor using no ignitrons.

In another picture is a standard eighteen-weld Hydromatic gun welder.

Tack welder of gun type engineered by this plant to tack ends of steel 40-mm. ammunition boxes made there



Originally this machine operated in the conventional manner, firing two guns simultaneously, thus requiring nine impacts. Thermador rebuilt it so that the eighteen guns came into contact at one time under working pressure and it fires two at a time in rapid succession. Distribution of the welding current to the guns is by means of a keyboard and roller attachment in the secondary circuit. It would be fatal to both roller and segments were the former to pass hot from one segment to the next. So delay times were ruled out and positive action limit switches substituted. Results have been perfect. The keyboard operates in both directions, eliminating lost time due to dead head or back travel.

The net result has been more than to double the output of this machine, thus eliminating a bottleneck that has existed up to this time. It now requires 14 seconds to load the machine with three nose guides, jig them into place in the box, complete the eighteen welds and remove the work. This increase in use cycle required the substitution of a 200-kva. transformer for the 75-kva. original.

At first considerable trouble was experienced with heat in the seam welder wheel bearings due to poor conductivity of the graphite grease recommended by the manufacturer. Finally, a well-known brand of grease having a zinc base was tried out and there has been no more trouble along this line.

Needed Improvements

While speaking of improvements that could be made to equipment, why is it that manufacturers send out high-priced equipment built for single-phase operation, but having the driving motors (½ or 1 hp.) operate at three phase? The owner has only two choices. Either he runs an oversize conduit and a third full size conductor or he runs an independent three-phase motor circuit. Thermador had to do the latter. Why would not a single-phase motor have done the job?

The mention of conduit prompts an inquiry as to why these same manufacturers bring 440-volt leads out through bushed holes in the frame with no sign of a terminal box? Are there still shops where they wire this equipment open?

There are a few more gripes along this same line. One is that some manufacturers rely too much on impregnation to hold their transformer coils in place. In such cases, and we have experienced several, after the coils have been well warmed up by use, they develop a slight play along the core axis. This quickly increases until the pancake coils move from 1/16 to ⅛ in. with each impulse and slap together with an impact that soon pulverizes the varnish to dust and allows the ribbon-wound coils to cut through the tape, exposing the primary copper.

This means a shut down for repairs, often stretched into twice its rightful length of time by the utterly inaccessible space (gripe No. 2) usually assigned to the transformer. Most such delays could be avoided altogether if transformer coils were either solidly secured in place or were provided with adjustable clamps for taking up play.

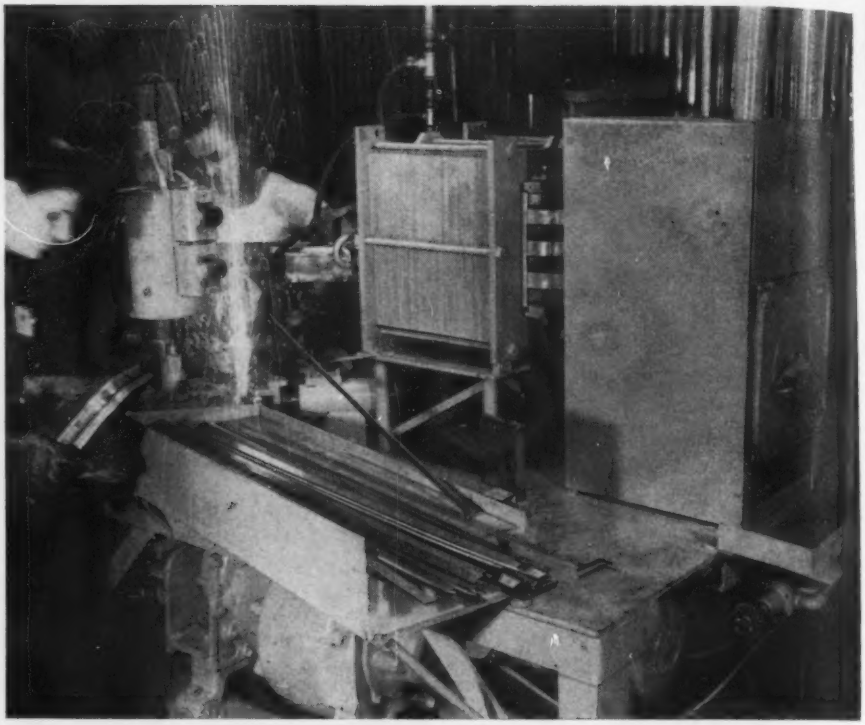
In one recent instance, it took longer to remove and replace the transformer than it did to rebuild it.

To sum this all up in a few words, the experience at Thermador indicates that the manufacturers should pay less attention to streamlining their products and more attention to perfecting for long, hard use and ease of access for service, repair and installation.

Wide Diversity

At the beginning of this article was mentioned that the total connected welder load is 3,200 kva. and that the grand total power load is 4,200 kva., in round numbers. For three years prior to April 1945, 4,100 kva. of this load has been carried by three 250-kva. transformers. Early this spring, anticipating the addition of another 100 kw. of infrared, a survey was made and it was found that largest 15-minute demand during the past three years was 1,200 kva. It was decided that with the coming of summer and installation of 100 extra kw. of infrared, the substation should be increased. So the three 250-kva. transformers have been replaced by three 500s, resulting in better voltage conditions and greater peace of mind for those responsible for continuity of service in the plant.

Ten years ago no one, least of all a power company engineer, would have thought it possible to serve a 4,100-kva. load from a 750-kva. substation. Today it is quite common practice, so I am told. All of which goes to show what a lot of things can be learned from experience; what a gulf often lies between theory and practice.



Combining a tack welder, break and jig, Thermador wrapped reinforcing band around bottom of box, jigged it into position and tack welded in one operation

Standard spot welder rebuilt to position, hold, tack weld longitudinal seam of 40-mm. ammunition box; 300 per hr.

Brand New Houses, Yet Already Obsolete

Specifications suggested to NHA for urging more wiring in war-built Title VI houses to give them reasonable adequacy for electrical use

BOTH to increase employment opportunities for contractors and wiremen and to break a wartime bottleneck of wiring inadequacy that may block the quick absorption of the new electric appliances, which in turn spell more employment and business activity, the Adequate Wiring Committee of the Pacific Coast Electrical Assn., has submitted to National Housing Agency specifications for additional wiring in war-skimped Title VI houses. With a potential of several thousand such homes built with minimum electrical facilities to be converted to reasonable adequacy, there is a market for electrical contractors and wiring materials suppliers of considerable importance in this move to "do something about it."

Work in this direction started last year when the Adequate Wiring Committee was under J. A. Hill, Pacific Gas and Electric Co., San Francisco, as chairman, and is culminating in definite recommendations this year with the committee under Elbert Kramer, Westinghouse Electric Corp., chairman, and R. Graham Holabird, National Electric Products Corp., vice-chairman. The committee prepared the following short specification for improvement in electrical wiring in Title VI war-built housing and submitted it to the National Housing Agency, in Washington, D. C.

Giving general approval to the idea, the technical director of NHA responded with some questions relative to certain features. Upon review of these questions by the committee, the requirements of the suggested specifications were reaffirmed except in one or two instances. These recommendations have gone to Washington for possible approval and circulation by NHA among owners of Title VI houses.

In the meanwhile, however, not waiting for this process to filter through slow official channels, assurances have been obtained from California lending agencies, such as banks and loan companies, that they would be willing to finance such modernization at reasonable terms should the industry decide to carry on a campaign of selling wiring modernization.

Full text of the specifications and of the correspondence in respect to these suggested requirements is published below to show the thinking and reasons for these reasonable recommendations.

The amount of materials necessary to construct Title VI Permanent War Houses was strictly controlled by the War Housing Standards of WPB. Consequently, the electrical wiring system in those houses was a wartime minimum recognized as totally inadequate to serve modern day electrical living. The permanency of these houses dictates improvements in the electric wiring as soon as material is available in order to bring the wiring system up to postwar living requirements.

The postwar wiring standards to which these houses should conform are as follows:

General Requirements — These requirements are based on knowledge of the houses and study of present-day electrical service and appliances which will be required in the small home after the war. These requirements are the *minimum* which should be installed.

Main Service—Main Service shall consist of not less than three conductors No. 8 AWG or larger. The distribution load center shall be a four-circuit panel or larger.

Lighting—Each room and hall in the house, including the front and rear porch and garage, laundry and basement, shall be provided with at least one ceiling or bracket outlet controlled by a wall switch except:

In the living room, den, or bedrooms the ceiling and/or bracket outlets may be omitted provided two-circuit duplex convenience plug receptacles are used and one half of each is connected to a wall switch.

Convenience Plug Receptacles—All additional convenience plug receptacles installed shall be connected to circuits of No. 12 AWG wire. There shall be a circuit for each 500 sq. ft. of floor area or major fraction thereof.

There shall be not less than the following number of convenience receptacles in each room:

Living Room—Four Convenience Receptacles;
Dining Room or space—Two Convenience Receptacles;
Kitchen—Two Convenience Receptacles;
Bedrooms—Two Convenience Receptacles;
Bath—One Convenience Receptacle;
Laundry—One Convenience Receptacle.

From C. W. Farrier, technical director of NHA, Washington, D. C., came the following comments in respect to the PCEA suggested specifications:

We have a few comments and questions at this time concerning the suggested specifications for the improvement of Title VI war-built housing. These should be viewed in the light of our conviction that every effort should be made to keep every cost at the lowest possible level consistent with providing safe, sanitary and comfortable housing so as to expand the market that can be reached by private enterprise without subsidy.

1. *Main Service*—It appears that an existing main service of two No. 6 conductors with a three-circuit distribution load center would be adequate for all probable loads unless an electric range or waterheater is used. Consequently, we question the need for remodeling the wiring system so as to install three conductors No. 8 AWG. or larger and to increase the distribution load center to a four-circuit panel or larger until the owner or tenant decides to install an electric range or waterheater.

2. *Lighting*—As proposed by your postwar specifications, sufficient convenience may be added to warrant the cost of connecting one duplex convenience plug receptacle to a wall switch when the ceiling and bracket outlets are omitted from the living room, den, or bedroom. However, we question whether the proposed requirement for remodeling Title VI housing to provide two-circuit duplex convenience plug receptacles is consistent with balancing cost against needs, particularly in the low-priced market.

3. *Appliance and General Purpose Circuits*—We agree that appliance circuits carrying convenience receptacles for ironer, hand iron, refrigerator, toaster, etc., in the kitchen, laundry and dining room should have not less than No. 12 conductors protected by not over 20-amp. fuses or circuit breakers. We should be interested in hearing the reasons for urging use of No. 12 conductors and 20-amp. overload protection in place of No. 14, and 15 amp. for circuits on which receptacles for other small portable appliances are installed in living room, bedrooms, bath and other habitable spaces.

4. *Convenience Plug Receptacles*—Does "additional" as used in the first line refer to outlets in addition to those originally installed, or to convenience receptacles required in addition to those provided in place of ceiling or bracket outlets? If the second meaning is intended, it does not seem reasonable to require rewiring with No. 12 AWG. all general purpose circuits carrying receptacles now installed with No. 14 AWG. which meet the requirements of National Electrical Code.

5. *Convenience Receptacle Requirements by Rooms*—If the dining space is located in the kitchen, is it intended that four convenience receptacles be the minimum required for the combined space? Further, is it intended that the living room have a minimum of four and the bedroom a minimum of two convenience receptacles when ceiling or bracket outlets are omitted?

If you will clarify these points, we shall be glad to give further consideration to the suggested specifications for improving the Title VI war-built housing.

The questions raised by Farrier were then resubmitted to the Adequate Wiring Committee of PCEA in two meetings, one in Los Angeles for southern members, and one in San Francisco, for northern members. Following a reexamination of each point, the committee replied to NHA in the following

way. The NHA had also suggested issuing a national wiring standard. This too was considered by the committee and it made a more practical suggestion for immediate circularization of all Title VI home owners with literature to suggest modernization of their houses as soon as materials and labor become available. Text of this is also contained in the following letter from Kramer as chairman of the committee.

1. *Main Service*—We feel it advisable to require three-wire service because of the flexibility and electrical balance that can be obtained only through this type of installation. From the standpoint of price it actually costs less to put in three No. 8 AWG. conductors as against two No. 6. With reference to the distribution load center, a four-circuit panel is standard nationally and occupies the same physical space as a three-circuit panel. With this in mind, it is a comparatively simple and inexpensive job to install a fourth circuit. In considering modernization of any of these Title VI homes, limited as they were under wartime restrictions to the number of outlets installed, it is inconceivable that any home could be brought up to desirable standards of adequacy without at least one circuit and many would require two or three additional circuits.

2. *Lighting*—We agree to your suggested revision to connect one duplex convenience plug receptacle to a wall switch when the ceiling and bracket outlets are omitted from the living room, den or bedroom.

3. *Appliance and General Purpose Circuits*—We are still of the opinion that our recommendation with regard to all additional outlets being installed on No. 12 wire throughout the house is sound for the following reasons:

a. Public demand for higher speeds and efficiencies in the operation of appliances has tended toward a consistently increasing wattage in the appliances so that many of them will no longer work at a maximum efficiency on a No. 14 circuit.

b. The working habits of women vary to such an extent that it is impractical to assume that all heavy duty appliances will be used at certain specified locations and that only the outlets at those locations need be on No. 12 wire. For example, the ironing machine is known to be used very generally throughout the house and there is as great a likelihood of its being attached to a bedroom outlet or a living room outlet as there is of its being used on the service porch or in the kitchen.

c. The cost differential between No. 12 and No. 14 is only about $2.50 per 1,000 ft.; therefore, the additional price of the larger-sized wire is not a consideration commensurate with the increased operating efficiency which is assured. In this connection, Vice-Chairman Holabird reported that in San Francisco quotations have been received for rewiring Title VI homes to the full specifications recommended by our committee at a cost of $75 and that the banks have agreed to finance such rewiring upon this basis.

The many complaints which have been voiced by occupants of war-built homes, because of the inadequacy of their wiring installations, have indicated an urgent need for such a plan and a very popular public acceptance of it. If the people have felt that their wiring was inadequate during the war when they have been unable to purchase the many electrical appliances which they desire, the return of appliances to the market will merely accentuate these inadequacies.

Recent national surveys have indicated tremendous postwar buying plans for all types of electrical merchandise.

4. *Convenience Plug Receptacles*—It was agreed that it would be impractical to rewire existing outlets but that inasmuch as the average home would require eight or more convenience outlets to provide adequacy, there will be at least one new circuit required in each home and that such circuit or circuits should be on No. 12.

5. *Convenience Receptacle Requirements by Rooms*—We feel that it is essential to have the combined outlet requirements as to convenience receptacles shown by rooms in our specifications submitted to you, used as in the case of combined dining and kitchen space. Our reason for this is that the types of appliances that will be used in the dining space when built in connection with the kitchen will be the same as though the dining space were a separate room.

The same will hold true of the electrical appliances used in the kitchen portion of our combined room as compared with those used in a kitchen occupying a space in itself. In other words, the recommended number of outlets for the kitchen is the minimum which can adequately serve the kitchen equipment and, if dining facilities are added in the kitchen area, the attachment of appliances for use at the table will require the same number of additional outlets as would be necessary if the dining area were separate.

It was also agreed that the number of convenience outlets recommended in bedrooms and living rooms was the minimum which should be installed regardless of whether or not these rooms were equipped with installed lighting fixtures.

Now that our country has returned to peacetime basis and restrictions are being removed on practically everything affecting manufacturing and the personal lives of our people, those living in Title VI homes will be definitely interested in bettering their living conditions from the standpoint of convenience, and realizing the need, will be interested to start modernizing at once. From this I am sure you will agree that there is need for working out a satisfactory solution of these wiring standards for these homes, particularly when there is a national movement for reemployment in industry. This phase of modernizing Title VI homes alone is a ready market for reemployment in not only electrical modernization but other phases such as plumbing, etc.

We have discussed the needed modernization of Title VI homes with our leading loaning institutions, as well as the electrical utilities in this area. We feel that we can definitely count on these organizations working with us to assist these home owners in working out their modernization problems. The loaning institutions will surely be interested in contacting their Title VI mortgagees on this subject.

It is apparent from the exchange of correspondence which we already have had with you that there will be delays incidental to the agreement upon the establishment of a national wiring standard. Such a delay could seriously inconvenience the home owners as well as retard the employment of the electrical workers which would result from the prompt initiation of this program.

May we suggest, therefore, that you give consideration to the possibility of issuing immediately a folder informing the Title VI home owner that, although he was given the very best home possible under the limitations of necessary wartime restrictions, these restrictions obviously deprived him of certain structural features which would normally be a part of a home such as his. This folder should then go on to state that the return to civilian production now makes it possible for him to add such features to his home as may be necessary to bring it to modern standards or to replace where desirable any wartime materials which may have been of necessity an inferior quality. In this latter category I have in mind such things as unfinished cast iron plumbing fixtures which he may wish to replace with desirable chrome finished equipment.

Such a folder issued with the prestige of your agency would unquestionably bring this subject forcefully to the attention of these owners and we have the assurance of the various loaning agencies such as banks and savings and loan associations of California that they would welcome having it available and would distribute it to all Title VI owners whose loans they hold. They inform us that they have already developed their plans for financing such modernization and feel that a folder such as we are recommending would be of material assistance in stimulating a popular recognition of early action by these owners.

There is no need to delay a program for selling wiring improvement to these Title VI house owners, the committee felt. Whether the NHA approves these specifications or not or recommends them to such purchasers of NHA homes, power companies and contractors can begin local campaigns immediately along these lines. Because these houses have simplified typical floor plans and wiring, a local program can be developed to offer a wiring modernization job to NHA Title VI houses at a more or less standard local price, based on labor cost in that area. Some companies and some local units of industry promotional organizations are already making such plans.

It is felt that with a successful drive among Title VI houses enough interest can be aroused among owners of other houses to stimulate a good deal of wiring modernization among them too. Contractors who develop a technique to handle this work quickly and economically will be in better position to offer reasonable propositions in rewiring to such other home owners after experience with Title VI jobs.

● On Sept. 4, the 8,000 lamps on Public Service Co. of Colorado's Gas and Electric Building flashed on for the first time since Sept. 25, 1943, when they were extinguished as a war conservation measure. The 64½-kw. job, serviced by some 250 miles of wire, had been burning almost continuously since Nov. 12, 1910, until the interruption two years ago, and won the reputation of being "the best lighted building in the world." The event inspired an editorial in the Rocky Mountain *News* expressing the hope that Denver will resume its place, this year, as "The Christmas City of the World."

Reminds That Code is Not a Handbook

James Moore Evans
Electrical Engineer, formerly with
Pacific Board of Fire Underwriters

THERE are two schools of thought relative to the National Electrical Code. Both are advocated by "well-wishers" who would like to have the profession produce the ideal code.

One of the schools wishes to produce a "standard" which will be a complete textbook on electrical wiring and only permit wiring of a high grade.

This group wants so complete a book that a high school boy can apply himself to an intensive study of the Code and become a competent journeyman electrician without further apprenticeship.

Most of the "standard" group realize that the ultimate goal is not practical but their warm personal interest in the Code and their appreciation of its usefulness as a valuable tool makes them add a little here and polish a little there.

Their feeling was well expressed by W. J. Mahan at the June meeting of the Western New England Chapter.

In commenting on Code problems he said, in part:

". . . in spite of this, we should endeavor to make our Code a good comprehensive standard even though it would involve additional information to be incorporated in the Code. A complete coverage is more desirable than a set of inadequate regulations."

It is agreed that cognizance should be taken of the conditions as they exist and clear-cut regulations that endeavor to protect life and property should be promulgated. Par. 2110 is such a regulation and, as it is a practical minimum, few people object to it.

But there are certain fundamental objections to having a code that is an ideal, "best construction" standard. The NEC is adopted as the technical basis for nearly 100% of the city and county ordinances of this country. It is a basis for construction in Canada and many, if not all, of the regulations of the countries south of us.

An ordinance regulating construction is a rigid piece of legislation and is not subject to modification by the inspector. Any "gold-plating," as unnecessarily excessive requirements might be considered, is impossible of being corrected by a sensible approach on the part of the enforcement officer.

It is recognized that gold-plating on copper wire will increase its conductivity. But it would be ridiculous to require gold-plated wire in a single-stall, family garage.

However, if the Code should require such "gold-plating," the inspector would be duty bound to require it.

To require every chicken coop, stable and fifteen-story apartment house to have a "best" standard of construction would put an unnecessary, unwarranted, excessive cost upon everyone. Because some office buildings appeal to doctors and dentists is no reasonable excuse to require all office buildings to wire every office for X-ray and other high-frequency apparatus.

Salesmanship has a definite place in the electrical industry. If more than a minimum is advisable, the architect and electrical contractor should "sell" the customer.

It is probable that only one type of simple control could be used on every elevator. But salesmanship has sold elevators and controls that cost ten times that for which the cheapest could be obtained.

It is a very definite infringement upon our freedom to set up a standard higher than that minimum required by safety to life and property.

Everyone of us wants to keep from having hazards.

Everyone of us wants to feel that there is one job we do not need to fear, as no one will be hurt by it.

There are times we feel it is advisable to infringe upon our freedom in order to assure ourselves that the dishonest and willfully criminal, as well as the over enthusiastic high school boy, is controlled and forced to protect life and property.

But, everyone of us wants to choose the degree of convenience that he thinks is advisable.

Anything beyond a minimum of safety should not be in the Code.

This is the stand of those in the second school of thought as mentioned in the beginning.

The Code should be a rigid minimum. Anything less than the Code requires should be recognized as a hazard. Any reasonable industrialist or home owner can be sold on adequacy.

It is unreasonable to penalize *everyone* because there might be a definite value in forcing a certain degree of adequacy upon a selected few.

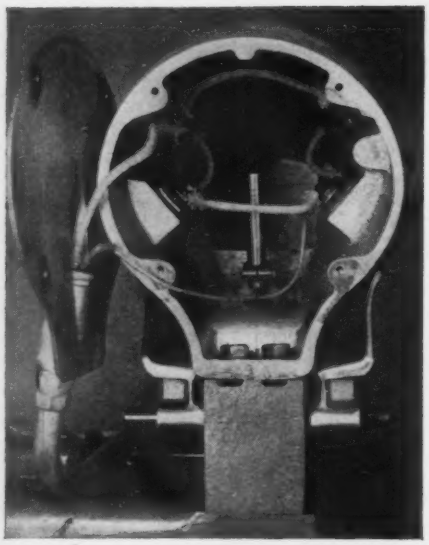
Parts are dipped into the hot solution in thermostatically controlled electrically heated tank and thus coated

Plastic Protection

Accuracy of heat control as well as safety are two attributes of electric heating which are employed in a novel application at the Naval Supply Depot at Clearfield, Utah. Electrically heated tanks of a double-boiler type are used to keep hot a solution of plastic which is applied to metal parts of machines before shipment to the theaters of war. The plastic, developed from ethylcellulose, is applied by dipping the parts in it. Its use cuts from 62 to 90% in packaging time, saves quantities of paper and cushioning materials, eliminates the use of heavy grease in which parts formerly were coated to prevent corrosion, makes the parts more readily usable upon reaching destination and offers general protection, for years if need be, to such coated parts.

The double-boiler type of tank has in it two 4,500-watt heating elements in liquid proof covers, the heating coils sealed within steel blades. Hot oil is used as the medium for transmitting the heat from the heating elements to the sides and bottom of the tank and through tubes located along the length and width of the inner tank to maintain constant melt throughout. Temperature is maintained within limits of between 350 and 375°F. with a temperature variation of not more than 3°. Heavy insulation around the tank reduces heat loss. About four hours are required to preheat the mixture.

Dipping process merely requires immersing a part in the molten plastic compound. This adheres as a closely fitting skin to the metal part, about one-tenth of an inch thick. Upon cooling it is hard and resists rust, corrosion and dirt. On arrival at point of use the coating is merely slit and stripped off like a banana peel. Without other treatment it can be inserted quickly into a gun or engine. About 2,000 parts can be processed in this manner at the Clearfield Naval Supply Depot per day.



Opened up, tire repair unit, showing strip heaters and thermostats. Below—Repair unit which is used on sections

Better Recaps

John S. Butsch
O. K. Rubber Welding System
Denver

HOW electricity again aided in keeping the precious tires of American motorists rolling during war years is one of the interesting sidelights of wartime industry of which little is known. Nearly one thousand operators of the O. K. Rubber Welding System employ electricity for the repairing and recapping of tires. By the simple plug-in process at a convenience outlet, the necessity of boilers, steam fittings, and other heavy equipment that is needed for recapping by the steam method, is eliminated.

Accuracy and precision control of electricity has proved to be a distinct advantage in processing tires by this direct-application procedure. Each unit is thermostatically controlled, and through the distribution of heat from the electrically heated elements of the machine, the curing heat is directed to the portion of the tire to be cured, which protects the balance of the tire from excessive and destructive heat.

Operation of the O. K. System's equipment, whose main office and assembly plants are located in Denver, is contingent solely on the availability of central station power lines. Some of the units require only 110-volt plug-in outlets, but the heavier machines require 220 volts.

Connected load necessary to operate the small tire repair unit is one-half kilowatt; larger repair units pull one kilowatt, and recapping machines pull from four to nine kilowatts.

Full recap mold, opens in two sections, and maintains controlled temperature both inside and outside the casing to make a recap in a single operation on tire

The amount of outside wiring needed to service a tire shop depends, of course, on the distance from the operator's establishment to the nearest distribution lines. Usually, however, these lines run only a few yards away.

A shop equipped with five tire recapping and repairing units would demand only 30 ft. of No. 4 wire, this being the amount needed to connect meter with fuse box—and about 60 ft. of feeder wire running from load center to each unit.

The small amount of wiring is explained by the vertical installation of all O.K. servicing equipment. Whereas the majority of conventional steam-fitted machines are horizontal and require about six feet of floor space, the O.K. equipment stands upright and occupies only three feet, more or less. Many other advantages attach to the direct-application-of-electricity system. For instance, when a tire has completed its cure, it can be removed quickly and easily, while a longer process of curing, and bleeding of steam, is incidental to steam-processing.

This system operates each unit separately, inasmuch as every machine has its own power switch which may be turned on or off as required. This is not so important in these emergency times when most recapping plants work around the clock; but in postwar operation, when the plants will be used on a part-time schedule, instant electric control will prove to be an important economy factor.

Electricity, conducted direct to the heating element, has proved to be a tremendous asset in the processing of synthetic rubber, where absolute temperature and accuracy of curing time is vital. The positive and accurate control of the electric thermostat is far superior to other types.

In case of trouble, the cause is easily located when electricity is the source of heat. Two checks can be quickly made (1) the fuse box, and, if failure persists, (2) the wiring system, either leading to, or in, the heating element.

The O. K. Rubber Welding System provides its operators with all the materials, equipment and operating supplies, making this organization the largest single distributor and user of tire repairing and recapping stocks in the nation. It has five strategically-placed warehouses from which the operators can secure needed materials.

As in many other uses of electric heat in industrial application this tire repairing and recapping method has proved advantageous because it saved critical supplies of metal and rubber; eliminated boilers, steam lines and fittings through direct conduction of electrical heat to matrices, and effected economy both in cost and in rubber by application of curing heat only to the tire area under treatment.

Can't Agree on Prospect Distribution

But dealers in Utah and Colorado coincide closely in other queries which the power company asks in a system-wide merchandise survey

DEALERS have spoken. In the first comprehensive survey of its kind among all the dealers on its system, the Utah Power & Light Co. and Western Colorado Power Co. asked for dealer opinion as to its sales program and got it; frank outspoken opinion. And the answers indicate that the policy of this utility company is approved, its methods are generally in the right direction to suit dealers and they ask it to continue with it.

There was no issue as to whether the company should or should not merchandise for that had been previously decided. The company does no more direct selling. One question as to whether the company should sell some appliances new to the public and needing promotion was asked. The only other question of controversial nature was as to what to do with prospects which the power company develops.

Presented to the dealers throughout the systems of the two linked companies by dealer contact men in person, time was taken to explain the booklet containing the questions and to urge a careful study and frank answering. Two copies were left with each dealer, one to keep, one to return with his answers. The combined results are now compiled and are being returned to the dealers in another booklet, *Here's What Dealers Think* which began to be circulated Oct. 1.

Because other power companies and many dealers, as well as cooperative leagues and organizations, have been anxiously awaiting Utah Power's survey results, rather full quotations will be made here from the advance proofs of the booklet sent air mail to ELECTRICAL WEST by W. A. Huckins, sales manager, and M. L. Cummings, advertising manager of the company.

The book reprints the original page and its questions and faces it with a page containing the vote on the questions asked, with many dealer comments quoted directly from their replies. It will be seen that, although trends are similar, dealers have variations of opinion.

First question asked was whether the slogans, "Better Living Electrically," "Better Business Electrically" and "Better Farming Electrically" were an effective appeal. Answers of 99.4% said yes, 6% said no; 94.7% thought no other appeal would be more effective, 5.3% thought perhaps some other might be.

On the question as to whether dealers favored the policy of promoting the sale of electrical appliances and equipment through dealers only, 98.4% said yes, 1.6% said no. Another question, "Do you think certain items should be sold through the power company?", 18.4% said yes and 81.6% said no. Comments on this point, both ways, were expressed by nearly all and the following are typical of the answers.

I believe it a good policy for the power company to sell power and service only to the consumer. Dealers will work together more smoothly and do a better selling job if they have the assurance that they are not in direct competition with the utilities.

We do not feel the power company should sell at retail under any circumstances, but in the case of new items, which you should like to promote, we believe it would be satisfactory for you to stock the items for resale to us to insure adequate supply, or arrange with jobbers to have them available in quantity during the selling campaign.

If they can buy some at the power company, they soon expect all. It should be 100% dealers or none.

I believe the electrical dealer should be able to take care of all the electrical appliance and equipment needs of their particular sales area. The power company selling help and advice in the past has been a great help to the dealers.

However, a few responses showed an attitude in favor of the power company selling merchandise, with certain qualifications and under certain conditions:

Items that dealers are not willing to promote actively should be sold by the power company.

Any item which requires special promotion and a good load builder for the power company, we feel should be sold by them until the dealer can profitably sell his merchandise.

The power company should help to pioneer new appliances coming out, like a six-month period. By that time dealers should be established to keep it moving.

Only such items as are not in common use and consequently cannot be readily supplied through regular retail channels.

Asked if they would take full advantage of sales assistance, sales training, services of home service women and a large force of salesmen who will work with dealers, 98.9% said they would, 1.1% said not. Asked if they desired help in training their own sales people, 88.6% said yes, 11.4% said no. Further light on these opinions is contained in these comments on the utility sales program:

Careful that, whether intentionally or not, in the end a few large dealers do not receive all of the assistance.

An occasional pep talk will be of great assistance to us. When any new item is offered to the public, a little special instruction might be advisable.

Demonstrations are always very helpful in creating a desire to possess. A continuation of this policy by the power company should be very welcome to all dealers.

A good combination for best results would be a thorough knowledge of each product gained by a session of your salesmen, our salesmen and manufacturer's representatives.

I think training classes in the mornings once or twice a month in different items is okay.

We believe this assistance would be better if this training could be had by each store and its own sales force rather than in a "group school".

I think this plan is fine and can possibly be added to later on.

Group sales demonstrations by your trained specialists. Better acquaintance between your contact representative and dealer sales force.

Nearly all of us dealers will urgently feel the need of rebuilding our sales organizations. I am sure we would appreciate some help or suggestions on how to best accomplish this. Maybe a training program for salesmen and service men.

In respect to definite promotional activity on all types of appliances, the majority heartily endorsed prewar activities on the part of the electric utility and urged continued aggressive advertising, featuring the advantages of electricity and the holding of public demonstrations. Almost to a man, the dealers recommended that the utility take the lead in the promotion of new types of appliances.

The problem that was touchiest, that of distribution of prospects, is not settled by the answers to the survey questions. The query, "Should leads be given to only one dealer at a time, rotating them among all dealers in the community?" drew a division of opinion, with 41.5% favoring this suggestion and 58.5% opposing it. A second question, "Should leads be given to all dealers in the community at the same time?", had a yes vote from 68.8% and no from 31.5%. One dealer truly said it when he commented, "If you like handling hot wires, here is a hot one."

Comment on this issue shows the difficulty facing Utah Power in making any decision. The booklet, on its final page, commenting on the controversial subject says, "However, the minority objections are so sound that further

study will be made. This will be done in connection with some of the other comments." Samples of the dealer remarks on this point follow:

Distribute to two dealers at a time in rotation. This gives assurance of a sale, some competition and still not so much that a customer will become confused.

Other than give the dealer the lead—give the customer the list of dealers.

Let each dealer get his own prospects.

Give only to those with the promise and ability to service as well as sell. Unless a service department is actually set up and in operation, no prospect should be referred.

Open competition is the best method of getting the merchandise sold, for if one dealer is not active leads may be lost.

We believe the wise buyer will shop. I think the dealer should sell on his own merits, do enough advertising to get the trade name-minded. We think if the customer should ask about an item, the power company should know the product enough to tell the customer something about it.

Publish weekly "lead lists". Let the dealer that is out to get the sales go after them.

If leads are given to all dealers—confusion will result and customers may become vexed and discouraged. Would you like 30 insurance men to know you were interested in a life policy?

Why waste dealers' and salesmen's time giving all dealers the same lead?

I think by giving leads to all the dealers at one time will make for better competition, thereby giving to a customer a better chance to get what he is looking for.

The leads should be given to about three dealers at the same time and rotate them among all dealers in the Salt Lake district.

I suggest that in rural districts leads be given to dealers in restricted territory.

We believe by allotting to one store at a time prospective list of customers, each store will concentrate on their list and do a better job and avoid a lot of duplicated effort by several stores all trying to interest same prospects at same time.

Some dealers will carry one or two appliances on their floor as side line. Therefore dealers with good representative stocks on display show they are in the appliance business and surely should be given preference.

After a lead has been given to one specific dealer and he doesn't follow through in a specific time, give it to another in the same territory.

I believe more than one dealer should have an opportunity to contact leads. This will benefit the buyer, as he can choose the product that fits his particular needs by comparing different products, keeping him happy and also showing no favoritism in the eyes of the public.

Most buyers will contact two or more dealers before buying anyway and it would keep out complaints against your reporting; if reported to all dealers in the community, there could be no feeling of favoritism which would defeat your purpose.

Mailing out letters to all dealers on a prospect is not only a waste of paper but irritates the customer to the point that, if you happen to be about the third salesman to arrive the door slams in your face and they will not buy at all for the time being. A good salesman has a regular list of customers which he keeps in contact with; the name could be added, a routine call made.

Proposing to encourage dealers to operate appliance service departments, the company asked how many had such departments; 41.2% did, 58.8% did not; 85.8% thought a service department helped build sales, 14.5% did not; 65% thought a service department would pay its own way, 35% did not, and 90.1% favored organizing of servicemen's training classes, 9.9% did not. In the comments, one suggested a clearinghouse or central service department in which all dealers would pay a proportionate share. Many objected to the power company offering free service or competing with service dealers. Some suggested the wholesalers handle service.

Another question which has bothered a good many power company sales managers whose companies have gone out of merchandising is what to do about making appliance displays on the floors of its offices. The question was asked whether the dealer would like to display his appliances on power company floors and in windows during special campaigns, whether general displays carrying no dealers' names would be helpful to sales. To this 89% would like to display, 11% not; 83.4% seemed to think displays without dealer names would be stimulating to sales, 16.6% said not. But among the comments many suggested lists of dealer names. Some even offered to pay rent for space on company display floors.

Ninety-seven per cent liked the home service program proposed and some even declared they would have home service girls of their own and would like assistance from the power company in their training.

Of the farm equipment dealers queried, stress was laid on demonstrations of farm equipment and plenty of advertising, some favoring radio, some rural paper and magazine, other direct mail. In the commercial field, the comments were all favorable and laudatory of the company's sales assistance, layout work and general helpfulness; 94.7% said they would take full advantage of it, 5.3% were not interested. In the industrial electric field, there are few dealers but all urged continuation of efforts under the plan, group demonstrations and demonstrations at places in which equipment is used.

As to the use of the low-cost electricity appeal, 95.9% plan to use it as a sales builder, 4.1% do not. The comments were generally of a nature urging more such advertising and asking for charts showing operating costs of various appliances. Advertising of the company, 100% said, would help sell electrical appliances, 100% thought it offered a dealer a fine tie-in for his own advertising, 95% would like to receive window display material, 5% would not.

The company offered dealers the use of Reddy Kilowatt in their electrical appliance advertising if they wish him, and response to the offer was not conclusive as to whether dealers will take advantage of the idea or not. Some were strongly in favor, others seemed not to be fully acquainted with his possibilities. Further study and trial of various campaigns for dealers incorporating Reddy may be tried.

The survey answers were not asked to be signed. Many dealers proudly signed them, put their stickers or rubber stamp identifications on them nevertheless. What the company did ask was a classification of stores, and the replies came from the following in

Compiling the results of the dealer survey: Nell McCarrel, chief clerk, W. A. Huckins, sales manager; M. L. Cummings, advertising manager, and Veda Stander

the percentages enumerated: Electric appliance stores 18.0%, hardware stores 15.9%, furniture 12.0%, department stores 10.9%, combination stores 9.8%, drug stores 8.8%, contractor dealers 8.2%, lumber yards 5%, novelty stores 2.7%, and others 13.2%.

Utah Power feels that dealers have given the stamp of approval to its program and in expressing thanks to the dealers for their support and participation, promises all-out support from the company, intensified as electric appliances and equipment become available in larger quantities.

Drops Direct Sales

Edison will discontinue the direct sale of all types of electrical merchandise to its customers, including lamps, and will engage in a vigorous promotional campaign for sales through dealers. This was the news of the month in southern California, as R. R. Walbridge, vice-president, Southern California Edison Co. Ltd., made this announcement to the press late in September. Thus came to an end the uncertainty which has shrouded the postwar merchandising policy of one of the West's largest power companies and hithertofore an energetic advocate of direct sales to its customers.

Previously in answer to questionnaires, Edison Co. sales officials had declared that it would return to its prewar merchandising policies. In the past few months reconsideration was given to the matter and the new decision was reached, according to Walbridge, because of several new conditions:

"Many factors contributed," Walbridge said, "one of the most important being the greatly accelerated interest in electrical labor-saving devices for home use during the war years, and the resultant increase in the number and quality of dealer outlets in the Edison Co. service territory.

"A large backlog of purchasing power for electrical appliances and equipment has been stored up during the war years, and for the future an inadequate supply of these appliances to meet all demands is indicated.

"We believe that the domestic sales department, which is directed by H. C. Rice, will be most effective in aiding the development of long-term selling programs—working directly with the dealers and distributors in this market area in coordinating sales plans and promotional activities.

"A corps of experienced Edison men will soon be in the field working with dealers, architects, builders and contractors to promote range and water heater sales, adequate wiring and better lighting. Market surveys will be made and training programs for dealer salesmen will be held. Materials and suggestions for store and window displays will be supplied, fair exhibits will be used and seasonal campaigns on appliances will be held.

"These activities will be supported by a vigorous advertising program using newspapers, direct mail, billboards and other effective media.

"A staff of Edison home economists will conduct cooking schools and will be available to assist purchasers of electric ranges to receive the fullest measure of convenience and economy from this modern cooking method.

Mrs. Theia Kamerer, Edison home economist, in the clinic's portable kitchen

Canning Clinics

As a part of its wartime service to housewives, the Southern California Edison Co. currently is offering a series of canning consultation clinics for a week each in nine of its district offices. The clinic is conducted by Edison's home economist, Mrs. Theia Kamerer, using portable equipment originally designed for school demonstrations based on suggestions from school authorities and the State Association of Architects.

Mrs. Kamerer conducts the clinic by actually preserving small quantities of fruits and vegetables continuously throughout the day, and women are invited to consult her regarding home canning problems. Often they witness an actual demonstration of a canning process, and booklets on home canning are available to take home. Both the pressure cooker and hot water bath methods are demonstrated.

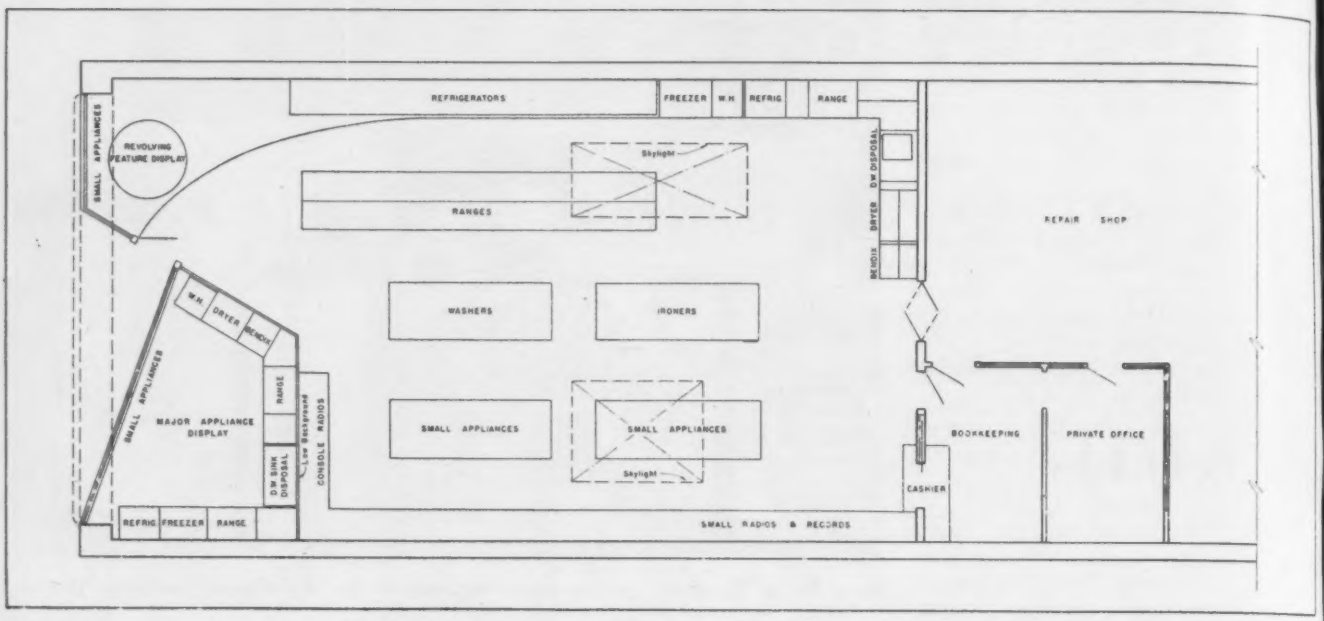
Response to the series has been gratifying according to H. C. Rice, Edison's manager of domestic sales. Since the methods demonstrated may be used successfully on any type of kitchen range, women are appreciative of the helpful advice they receive and many of them come to the offices expressly to consult Mrs. Kamerer. More than 50% of the women who come to the offices to pay bills or for other reasons take time to discuss home canning with Mrs. Kamerer, and almost all of them take a booklet or two home with them.

The equipment used for the demonstrations consists of a portable kitchen sink attached by flexible rubber hose to the nearest water supply, an electric range, a specially designed kitchen cabinet with adjustable sliding shelves and a special type of counter that approximates a work-shelf in a modern kitchen. The pressure cooker and other utensils fit in spaces built for them in the cabinets and the cabinets, counter and stove are mounted on castors to be easily movable. The unit was to be returned to school demonstration work when the fall term opened.

Industry Parade

Everything from new electric irons to speedboats went on display at "Industry on Parade," the second annual Southern California Industrial Exposition, Sept. 1 to 9 at the Pan-Pacific Auditorium in Los Angeles.

Everett H. Burnside, managing director, estimated that 120,000 spectators saw the showing of postwar products and industrial methods. The auditorium was jammed with 162 exhibits, more than double last year's 73, and as the show closed Burnside predicted the day is not far off when a permanent industrial mart will be built in Los Angeles.



Window at an angle with electric kitchen in it is advised for this typical narrow store. Dealer may change arrangement

New Plans for Old Stores are Offered

ONE of the results brought forth in the recent survey of dealers made by the Department of Water & Power in Los Angeles was a desire on the part of dealers for assistance and suggestions in the modernization of their stores. They were found to be eager for interior designs and suggestions for exterior store front modernization for window and store lighting.

When the refresher course for dealers was held, this service was offered to them. Likewise, field men contacting dealers and service shops who will be potential dealers, from three to ten times per year, had found an indication that this type of service was needed. Dealers, therefore, were encouraged to request such help from the department.

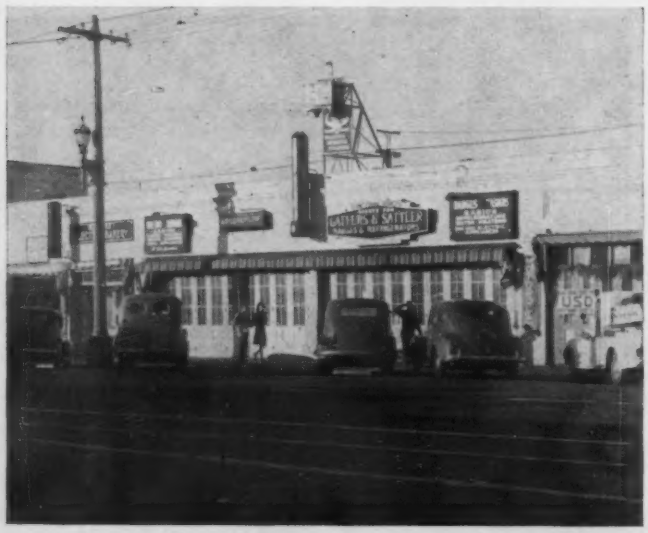
It was pointed out to them in such contacts that all would receive equal consideration and that the Department of Water & Power staff would make complete recommendations in which would be included the all-electric kitchen layout, if this was desired.

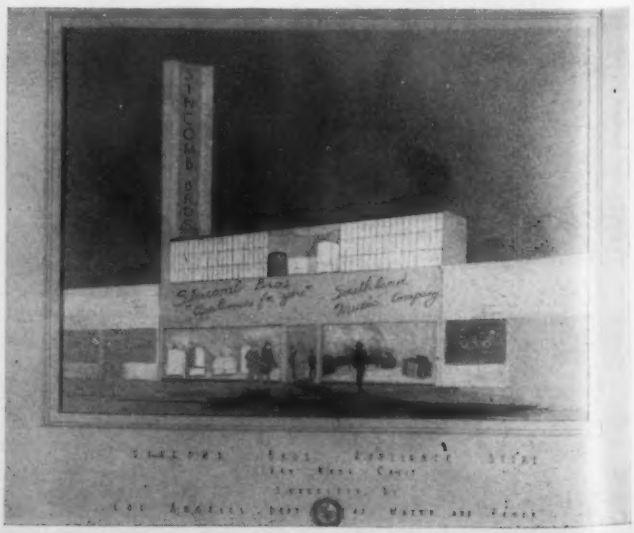
When a request was received, and a great many were, exact dimensions were made known and existing conditions were surveyed to provide Louis A. Politowski, architectural advisor, with the facts from which to design the layout. Politowski, who has been very successful in designing modern kitchen layouts, was equally clever in the design of store arrangements.

In each case he makes a drawing to scale but without dimensions. Then the blueprints are given to the illuminating engineering division under Ted Shepard and the illuminating engineers make recommendations on the plans for lighting.

Thus the plan includes layouts for the floor, the window arrangements, the placement of traffic merchandise

Before conversion the Sincomb Bros. store in San Fernando looked like this. When finished note the modern difference





How the slanted window, shown in floor plan, will appear

Swanson's Four Star store has a front that says it aloud

and for location of heavy or major appliances, and the kitchen and demonstration area. The plan is furnished to the dealer and he may take them to his own architect or builder and proceed with them as he sees fit.

These plans are delivered to the dealer personally and explained to him in detail. He is offered any further assistance but is advised that he is under no obligation whatsoever to follow the plans or to use them if he does not wish to. Nor does he have to follow the plan in order to get further assistance from the department. He is even told he does not have to put in the electric kitchen unless he actually wants to. He is shown, however, that it would be good business for him to do so in view of the active promotion which will be made on kitchen postwar.

Lantern slides and Kodachrome slides of the layout in color are often made by the department to use in future promotion. By June the department had made 35 layouts for electrical dealers, furniture, hardware and radio dealers and even a layout for a downtown department store appliance department and for chain stores.

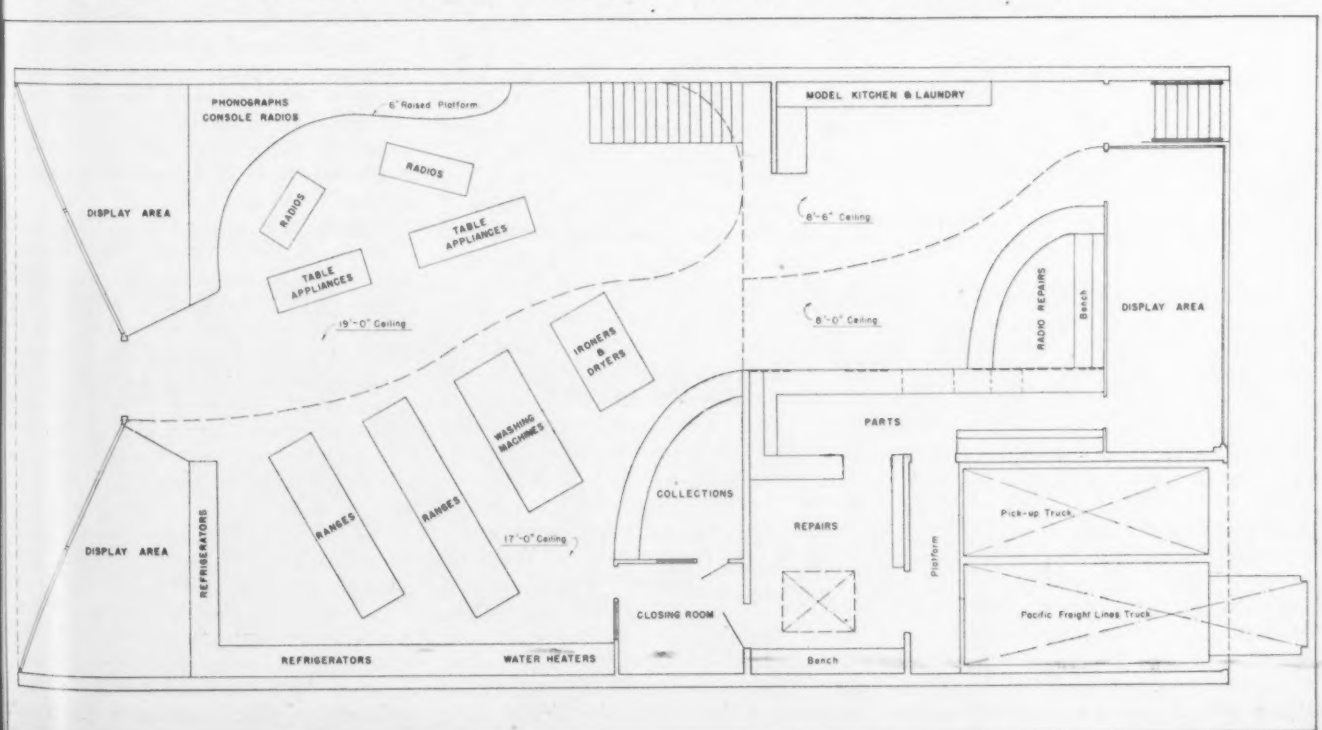
Under the similar program for plumbers, R. A. Samuelson has made such plans available to plumbers carrying electric water heaters and electric sinks.

These plans are only to be used as a guide with the dealer's own architect or engineer, according to Howard Burdick, dealer coordinator for the Department of Water & Power. They are not to displace the architect and no materials are indicated in the plan. Neither are dimensions given, although the drawings are made to scale. The merchandising arrangement is merely suggested.

However Politowski incorporates many new and modern ideas in window arrangements and floor placement which are eagerly followed by the dealers.

According to R. H. Cockfield, manager, residential section, the entire operation requires great tact in work-

Suggested layout for modernizing a music store handling electric appliances. Dropped ceiling on a curve is novel



Mrs. Cleo Filsinger and Luella Osborn, PG and E home economists, with home makers exhibit. Left—Window tie-in

ing with everyone who is involved. With a department store it requires working with the department manager, the display manager, the general manager, the maintenance engineer, as well as the store's architect. With the individual dealer it is simpler but, if he has a builder or architect, it requires working with him. He was emphatic in saying that the service is available to any dealer in electrical appliances no matter how big or small.

The illustrations on preceding pages show some of the stores as they look now and the drawings for proposed new fronts and interiors.

Electronics Meeting

The initial meeting of the newly formed Electronics Division of the Bureau of Radio and Electrical Appliances of San Diego was held Sept. 12, in the Electric Building Auditorium of the San Diego Gas & Electric Co.

The meeting was called to order by Grayson Lovell, temporary chairman, and was attended by more than 75 San Diego radio technicians, in addition to radio parts distributors and a representative from the Federal Communications Commission.

Lou Ferris of the San Diego Vocational School announced the formation of a series of classes designed to refresh radio technicians on the various phases of radio. There will be 24 classes in all, held once a week. Subjects chosen will be those requested by the dealers, and will include such topics as high fidelity, types of amplifiers and how to check them, tone compensation, acoustics, speaker matching, radio frequency circuits, special testing equipment, interference, frequency modulation, television trends and parts selection.

Ferris also announced that the vocational school now has available a test to determine the ability of technicians hired by the radio dealers.

Verne Milton, manager of KFMB, San Diego, in a talk on frequency modulation predicted that it would be in San Diego within a year. He stated that his station, along with several others, was seriously considering installation of FM equipment. He warned that good sets would range from $100 to $200 in price, and a thorough knowledge and understanding of their operation would be required on the part of the dealers in order that proper service can be maintained.

An open discussion by radio parts distributors present revealed the opinion that delivery of parts would be delayed until OPA prices would allow fair margins of profit for manufacturer, distributor and retailer alike. High labor costs in factories were blamed for necessitating price adjustments. Participating in this discussion were Ivan Lauritzen of Coast Electric Co., Norman Johnson of Western Radio & Electric Co., Harold Burt of Harold W. Burt Radio-Electronic and W. Lowell Wood, Packard Bell distributor for San Diego.

That a billion dollars worth of radio equipment is to be released by the government through ten selected agencies was revealed by W. Lowell Wood in a discussion on government surplus parts. He stated that plans for the sale of this equipment to dealers had not been completed. Some equipment, he said, is limited in type and scope for use by radio dealers today. Packard Bell may have some $2,000,000 worth of government excess parts in the near future. Hope was expressed by those present that this subject of excess parts could be studied more thoroughly at the next meeting of the Electronics Division.

Elected to serve as chairman of the division and its representative on the bureau board of directors was Ray Dobler of Dobler Brothers Radio Service. Vice-chairman elected was Grayson Lovell of Precision Radio.

Home Makers Center

During wartime, nutritious meal planning becomes more than ever a matter of how, what and when to buy and what to substitute for items which cannot be secured. Since these are problems for a trained home economist, Pacific Gas and Electric Co. saw an opportunity to serve its San Francisco domestic customers with a home makers center, where information could be given on safe and approved methods of food preservation, food and rationing problems, care and use of equipment and kitchen planning.

The idea originated with Mrs. Cleo Filsinger, home economist, who selected as an ideal location for such a center the San Francisco division main office at 445 Sutter St., where there is a steady flow of customers to transact business and pay bills.

Space was available on the main floor and Displayman Chad Hulbert was called in to arrange an exhibit which would carry sufficient punch to command attention, yet would not detract from the business office appointments. Hulbert designed the exhibit illustrated, allowing for periodic changes to meet the needs of the moment. The tie-in window display was arranged to give additional publicity to the center.

Heavy schedules of the division's home economists prevented staffing of the booth full time, according to Frank Talcott, division sales engineer, but in a three-month period 1,200 men and women discussed their food problems at the center and 3,200 pieces of educational literature were given out.

Dealers—

Roll Your Own Planning—VII

Case study of San Jose dealer who HAS a plan

Silva has 15,000 prospects

WHEN Roy W. Gordon went to war, his partner, R. B. Silva, of the energetic San Jose radio and appliance firm, Gordon & Silva, completely converted what had been an attractive and well laid out merchandising store, at Third and San Fernando, into an appliance and radio service shop. Rather than shift into the sale of various gadgets Silva decided to concentrate on the appliance business, make it continue until his partner could rejoin him and appliances again became available.

Planning is something they both believe in and so, while their immediate plans for expansion were put aside, larger plans developed for postwar. The display room became the service shop. The radio room, carpeted and with its comfortable chairs, was stripped to make storage for radio sets awaiting parts. The warehouse at the rear became the shop. The next door store into which it had been planned to expand was subleased to a shoe shop.

It had been an efficient set-up too, for beside the main floor show room, where refrigerators, washers, ranges and ironers had been displayed, there was a special sales closing room downstairs where the prospect who really wanted to buy was taken. There a selection of the appliances permitted comparison. There were sales manuals, visualizers, easy chairs, sound slide and movie projector with which to show sales films in closing the sale. The salesman was alone with the prospect, uninterrupted by store traffic. It had been one of the finest sales ideas Silva had developed. Now that space is a storeroom.

But while concentrating on keeping appliances in working order during the war, Silva continued his planning for his partner, a staff sergeant now in Germany. He had an opportunity to buy the building at the rear. Since he could not use it until materials became available Silva made plans for its future remodeling, meanwhile loaning the place to the USO for a dormitory for service men unable to find lodgings. It will accommodate 200.

Remodeling plans can soon be started. The entire store will get a new front. Where the shoemaker shop is will go the new radio department, with its own individual demonstration rooms. Washers will have a separate room. The main floor will carry a varied display but actual sales will be closed in special demonstration rooms featuring one type of appliance. Where the shop is now will become added showroom space. There will be an electric kitchen.

In the newly acquired building at the rear, which faces the Pacific Gas and Electric Co. office, the repair shop and radio repair shop will be moved. Individual sections of the shop will be devoted to radio and television repairs, washing machine, refrigerator, etc. The street floor windows will be used to display guaranteed rebuilt used merchandise.

On the second floor, visible from the street, will be built attractive display windows, kept well lighted at night, from which people across the street or driving by will be shown spectacular displays of appliances, an electric kitchen, etc. An auditorium in which cooking schools and demonstrations can be held will be built on the second floor. Being across the street from the utility office, Silva contemplates close cooperation on all promotional programs.

"We have never let the public down on service during the war," said Silva proudly, and pointing to a well arranged file of 15,500 job cards kept on appliance and radio service, he said this was his prospect list for the future. Consumers request for appliances have been listed but no deposits were taken. "As soon as we are assured of stock, we will turn back to what I like best, selling," Silva declares.

Gordon & Silva will have an entire new corner unit

Loaned to the USO, it will soon make enlarged store

Prepared by Planning Committee, Pacific Coast Electrical Assn.

ELECTRICAL WEST

McGRAW-HILL COMPANY OF CALIFORNIA
68 POST ST. SAN FRANCISCO . 4

The all-industry magazine of progress, established 1887 and incorporating the "Electrical Journal," "Journal of Electricity, Power & Gas" and "Journal of Electricity." Contents Copyrighted.

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Industrial Opportunities

ELSEWHERE in this issue ELECTRICAL WEST appraises the industrial outlook for this region because of a genuine feeling that industrial development offers the whole electrical industry its greatest opportunities. We are convinced that a sound and expanding industrial economy is the key to jobs for the West's increased population and to higher levels of prosperity.

In this region the power load of the serving utility systems more than doubled during the war. Some of this demand will drop, but the potentialities for bringing it back to its wartime peaks, or even higher, are unlimited. Some estimates place the over-all degree of industry electrification at less than 50% in terms of using electricity for all operations than can be done more efficiently and economically. There are opportunities for electrical growth and development hidden behind those statistics that can mean prosperity and profits for electrical contractors, wholesalers and manufacturers, as well as the power utilities.

Even more fundamental, however, is the over-all significance of greater industrial electrification to the West's whole economy. The use of more electric power by industry will increase the productivity and income of the workers. Thus it is the key to lower prices, greater consumption and more employment for more workers. If the electrical industry can make that kind of a contribution to the future welfare of this region, it is certain to be repaid.

Modernization or Maintenance

DURING the war period there was much talk of the large deferred maintenance programs that would face power companies postwar. In a discussion with a utility executive recently, he made a very nice distinction between deferred *maintenance* and deferred *modernization*, pointing out that his equipment had been well maintained during the war and that the problem confronting his property was one of modernization, not maintenance.

This is a new approach and should help clarify thinking of engineers and management in bringing their systems up to the high standards now demanded. Modernization is a term being widely used by manufacturers in connection with oil circuit breakers and switchgear, and quite properly so, but the point of view may well carry on to other components of a utility system.

Much rotating equipment needs insulation modernization. Many systems could stand modernization also in the way of telemetering, supervisory control, relay protection, communication facilities, tie-line and frequency control and lightning protection. Similarly transportation and mechanized equipment of all kinds as well as tools might be modernized.

Whether the millions that must be spent by Western utilities each year for several years to come is called deferred maintenance, deferred modernization or capital expenditure, may make little difference so far as the actual dollars are concerned, nevertheless the psychological approach may make a lot of difference when it comes to selling someone on the idea of putting up the money. The term *deferred modernization* is very significant.

Don't Kill the Goose

WHEN the lifting of construction controls on Oct. 15 was announced, some of the Washington bureaucrats hailed the step as the opening of "the greatest single source of jobs in our entire economy." Labor echoed the cry, and the stage appeared set for history's greatest building boom. The feeling of optimism was promoted by surveys which show annual industrial construction budgets of $1 billion for the next few years, commercial building programs equally as great and a demand for new residences aggregating a million units a year for several years.

All of this sounds like a golden opportunity for the electrical industry, but deeper examination leads to the inevitable conclusion that it may turn

into a golden goose, and a dead one at that. This assertion is based upon word that the building trades unions will seek a universal wage rate of $2 per hour except for bricklayers and plasterers, who will demand a $2.50 rate. In the case of electrical workers, the increase would be about 18%. If these higher labor costs should act to deter the public from building or buying new homes, then the goose certainly would be dead.

Over-all effect of such increased labor costs can be estimated from figures covering the operations of an average well-managed electrical contracting business. Here is how his income dollar is divided: materials, 33.7%; labor 38.2%; overhead, 17.4%; taxes, 9.0%; net profit, 1.5%. If one takes cognizance of the fact that at least one-third of the material cost also represents labor, then it becomes apparent that the labor group actually takes 50% of every dollar the contractor receives.

Of all individual groups in the electrical industry, labor obviously has the greatest stake in the promised new construction boom. To jeopardize that stake, and the welfare of the whole industry as well, by a concerted drive for higher wages at this time seems to us to be killing the goose that will lay the golden eggs.

Labor's Day

ONE of the tragic ironies of war is that so many people profit by it—and that includes not alone munitions makers, but labor. There has been a spree of high wages and high purchasing power It is awfully hard, the morning after, to pay the price of the spree and the destruction of war by settling down to facing a lower standard of living. Therefore the temptation to rationalize with the illusion that inflated wages will mean prosperity.

What they do mean is high prices.

To keep the lid on prices will be impossible when the chief production cost may be labor and that cost rising out of control. Only the most rudimentary sort of thinking should make that evident. Evidently no one is thinking at all. Labor leaders seem powerless to stem the demand arising from the ranks of their unions for the same take-home pay for less hours of work. Probably they would lose *their* jobs if they tried to inject any good sense into this emotional boiling stew of demands.

Surely they must see, however, that, like the Japs, it makes liars out of them and labor itself when the terms of their contracts are violated in the heat of passion. Employers, who are expected to keep their pledges to the letter of the contract, can have no faith in anything a union pledges its members to do under such circumstances. Just as the Japanese army made liars out of the Japanese government, is there not the same danger that such intemperate demands and breaking of contracts on the part of unions will bring its reaction of lost faith in their ability to bargain collectively?

These are sober thoughts the friends of organized labor should do well to ponder. The whole nation needs to face the payment of the cost of the war, severe though it is. To force inflation rather than face the debt is to invite payment of even a higher price—almost if not total liquidation of all values, real estate, bank savings, war bonds, life insurance, even the money laid away in a sock.

Probably it is a cry raised against a storm, doomed to be drowned out in the roar of selfish demands. But surely it is one that all should raise for the preservation of the Nation.

A MILLION Americans suffered wounds and death to keep America free. That *is what we may be about to lose. A few bureaucrats, a few business men, a few labor "leaders" are so greedy that they fight the cooperation that is an essential in a free country, and they mislead anyone who will listen, with "promises" they know they cannot fulfill. The one thing that made this country great—the one thing that gave it the highest standard of living in the world—is individual opportunity, the opportunity for everyone to rise as fast and as far as his ability and productiveness could take him. Yet today these so-called leaders are misleading millions of Americans into thinking that security is better than opportunity, and this in spite of the fact that in all history, no leader, no system, no "ism" has ever been able to deliver the security it promised except one—the American system of individual opportunity earned by the individual American himself. The more you, as an individual, produce efficiently, the less will be the cost of what you make, and the greater your worth. The lower the cost of your product, the more people there are who will buy it. The more who buy it, the more secure your job. There, shorn of all the fancy words and glib talk, is what you need to remember about security, wages and jobs.* You *make your job secure;* you *determine your own future. But there are many honest Americans being misled by the same false promises that lulled and enslaved most of Europe. "Security" has a soft sound, but it means enslavement. Opportunity is not easy, but it is American. Those who want to keep Americanism alive had better say so and fight for it now. We are farther down the road to decadent European "isms" than you may think.*—From a Warner & Swasey Advertisement.

Coordination is Emphasis in Northwest

NWEL&PA revamped structure put in motion; peacetime plans made for all five branches of industry

Above — Pat Johnson, president, and Tom Roach, vice-president of group. Below—George Bragg and Lou Thrailkill, vice-presidents, Ore. and Wash.

PLANNING for new business for all five branches of the electrical industry in peacetime brought new tone and tempo to the first meeting held by the Northwest Electric Light & Power Assn. since V-J Day. In Seattle on Sept. 12, the association's executive committee met at the call of Pat Johnson, Puget Sound Power & Light Co., president, to discuss programs for each of the four sections and to approve a budget for the current year. On the same day, the electrical development committee, the association's over-all planning committee, met with its chairman, D. B. Leonard, Pacific Power & Light Co., Yakima, to plan a coordinated operation.

Present at both meetings were representatives of utilities, manufacturers, wholesalers, appliance dealers and electrical contractors. Emphasis was on a coordinated activity with the association acting as a common meeting ground for all these branches of the industry. These meetings put in motion the association's revamped structure provided for at the annual meeting last July.

Each of the four sections, Accounting, Business Development, Engineering, and Personnel, is planning two conferences during the year, a smaller fall conference of executives to detail a program and a larger conference in the spring to bring this program to completion. Many of the section subcommittees, of necessity dormant during the war period, will be reactivated and will focus attention on economic operation or building business.

Principal emphasis of both meetings was on the Business Development Section which has before it the important subjects of water heater standardization, electric house heating and industrial development. New activities looking toward increased business in the farm, residential, commercial, and industrial fields will be set up. Most of the utilities in the area will not merchandise appliances, though a few will merchandise in those spots not adequately covered by established dealers. Carl Edstrom, E. N. E. Appliance Co., Portland, and dealer representative on the committee, assured the group that dealers were gearing up to do a job as soon as appliances are available in volume.

J. C. Platt, Edison Electric Appliance Co., and W. M. Jewell, Westinghouse Electric Supply Co., both of Seattle, and representing the manufacturers and wholesalers, emphasized that utilities, whether they merchandise or not, should help promote new merchandise such as dishwashers, disposals, home freezing units, and automatic laundry. R. D. Horning, Seattle Electrical Contractor Assn., representing the contractors, stated that in many areas, utilities are finding it profitable to contract construction work. Several committee members reported the formation of local appliance dealers associations and local contractors association, and the committee expressed approval of the formation of such organizations as a vehicle through which promotion plans can be made more effective. Suggestion for an adequate wiring program for the association was proposed and favorably received.

Utility accountants are initiating studies looking toward economy of procedure. The engineers, not now pressed for additional capacity, will continue their studies of improved operating with particular attention to rural service, and in addition will undertake studies of load factor, demand, and diversity of house heating, a subject particularly live at this time in the Pacific Northwest. The personnel group sees necessity for rounding out a program in the employee relations field, and the establishing of policies respecting the employment of returning veterans.

Berkeley Snow, executive secretary, reported that the association's survey of electric company taxes in the five states, recently released, showed that these companies paid over $27 million in taxes in 1944. The association's promotion booklet on rural electrification is in the hands of the printer, and may be expected in late October, depending on the paper situation.

Joe Platt Bill Jewell

Berkeley Snow Eddie Anderson

Art Wegner Clarence Sherman

Los Angeles Conclave

Gerald W. Weston, for 19 years secretary-manager of the Electric Association of Kansas City, Mo., has been elected as manager for the newly formed Southern California Radio and Electric Appliance Assn., according to R. H. Cockfield, president, and will start the intensive promotional program of that organization, Nov. 1.

A sales conclave for the entire radio and appliance industry of the Los Angeles area will be held Oct. 31, at the Ambassador Hotel, both to introduce the new manager and to outline the program contemplated by this new electrical organization. While details had not yet been worked out, the meeting was to be an evening gathering and to have a compact program setting forth the association's objectives.

Weston comes with a background of wide experience. A Purdue graduate in electrical engineering, he has had factory experience with a large electrical manufacturer, managed the Kansas City electrical league for 19 years until the war, served a year with headquarters of the National Electrical Contractors Assn. in Washington interpreting government regulations. The Office of Civilian Requirements then hired him to head the department handling repair parts for the electric appliance, radio and mechanical repair shops, where he prepared WPB regulations with an understanding of the industry's needs.

While with the Electric Association in Kansas City he conducted promotional campaigns, refrigeration and appliance shows, radio shows, promotions of electric kitchens, appliances, radio, adequate wiring and directed sales training. He was an active member of the International Association of Electrical Leagues.

Coordinating Group

Revival of the Electrical Industry Coordinating Committee in Los Angeles began last month with election of new officers and increasing of the membership of the committee to give it wider representation. Ross Hartley, Electric Corp., was elected chairman; Burrel S. Manuel, Westinghouse Electric Supply Co., vice-chairman and Warren Penn, National Electrical Contractors Assn., Los Angeles Chapter, secretary.

A five-man executive committee was also named from among the larger membership. It consists of the chairman and vice-chairman and R. H. Cockfield, Department of Water & Power; G. E. Arbogast, Newbery Electric Corp.; and H. H. Fogwell, Thermador Electrical Manufacturing Co.

Full membership of the coordinating committee consists of the officers and G. S. Allen, L. G. Berger, H. L. Evans, S. E. Gates, A. H. Gudie, H. L. Harper, V. W. Hartley, H. C Rice, A. A. Schueler, J. B. Shamel, D. A. Smith, Harley Stewart, A L. Stone, M. G. Sues, F. C. Todt and W. G. Willson.

The Electrical Industry Coordinating Committee was first initiated at the suggestion of the late Earl Peak, then president of NECA, as a means of coordinating the efforts of all branches of the electrical industry and promoting cooperation rather than conflict. Its first chairman was Frank Watkins, purchasing agent of Southern California Edison Co., who directed its efforts until his death. Recently it was headed by M. G. Sues, but during war years was relatively inactive. The organization was particularly valuable in the Los Angeles area because of the diversity of interests, the large number of closely adjacent communities and the number of utility serving companies, both municipally managed and business managed, and their variety of policies, the divergence of incorporated and unincorporated areas and their codes and ordinances.

RMEL to Meet

Although officials cautiously refer to the forthcoming conference of the Rocky Mountain Electrical League, Oct. 25, 26, 27, as the "fall meeting," it probably will take on the dimensions and flavor of a convention. A dance, to follow the banquet, Oct. 25, is scheduled. Since there are not enough electrical industrialists' wives in Denver to properly "dress up" a regional dance, it is reasonable to assume the ladies are coming from Wyoming, New Mexico and South Dakota, besides Colorado, thereby officially ending the war and putting electricity and travel on a pre-Pearl Harbor basis.

F. F. McCammon, RMEL president, has appointed A. S. Anderson, chairman of the Engineering Section, as general chairman of the fall assembly. The first day's program, under direction of T. M. (Ted) Foulk in the morning, and Harold L. Rankin in the afternoon, will deal vigorously with adequate wiring and lighting. Foulk, who is chairman of the league's adequate wiring committee, is ready to launch an adequacy campaign, and Rankin, chairman of the sales and promotion division, will present a comprehensive program dealing with postwar illumination of all types, postwar merchandising and the position utilities will take in the sales picture.

The second day's schedule (Friday, Oct. 26) will concern itself with safety and accident prevention—in the forenoon under guidance of Anderson who has succeeded Lloyd Edwards as head of the league engineers, with emphasis on such pressing matters as deferred maintenance on plant equipment. Henry A. Mitchell, chairman of the Accounting Section, will conduct the Friday afternoon session on such subjects as labor conditions, rehiring of veterans, and a forecast of what the customer will expect of electric utilities in peacetime.

Election of officers will culminate the second day's business discussions—and nobody ventures a guess concerning next year's leadership.

Final day of the convention will find McCammon in the chair at a conference of utilities managers. This phase will definitely concern policy of utilities, and RMEL, for 1946.

● Atomic Bombs were the subject of the September opening fall meeting of the Electrical Maintenance Engineers Assn. of Northern California at PG and E Building, 447 Sutter St., San Francisco, Sept. 13. John H. Callaham, Pacific Coast editor, *Chemical & Metallurgical Engineering*, and Walter Heston, engineering editor, Electrical West, who had both visited the Hanford works in Washington, discussed the subject. M. F. Beichley, Westinghouse, presented lesson No. 8 on *Industrial Applications of Electronic Regulators*. Ross Manseau, president, had charge of the meeting.

● Victor Hartley became president of the International Association of Electrical Leagues recently, upon the resignation of its president to enter another line of business. Hartley had been vice-president of the organization. He is managing director of Pacific Coast Electrical Assn. The annual meeting of the IAEI is to be held in Chicago Nov. 1, 2 and 3 and it is expected both Hartley and J. Clark Chamberlain, manager, San Diego Bureau of Radio & Electrical Appliances, will attend.

● T. L. Matney, newly appointed chief electrical inspector for the state of Washington, addressed the September meeting of the Puget Sound Chapter, International Association of Electrical Inspectors, at Everett, Wash. He spoke on the future of state inspection and the problems confronting it. The next meeting of the chapter is to be in December.

● Harry V. Welch, chief technologist, Western Precipitation Corp., presented a talk on *Dust and Fume Control* at the Sept. 19 meeting of the Electrical Maintenance Engineers Assn. of Southern California. Clarence R. Miller, of the same company, is president of the organization.

PCEA Panorama

Business Development

Guidance committee sets program in motion

AS if presaging the early return to full association activity, the guidance committee of the Business Development Section, under Chairman H. C. Rice, Southern California Edison Co., met on V-J day, Aug. 14 and set in motion seven committee programs. These include: highway lighting, fluorescent lighting, adequate wiring, code and ordinance, range wiring, liquid petroleum gas and air heating survey committees. Chairmen of the various committees are members of the guidance committee. Rice also suggested consideration be given to industrial reconversion, commercial lighting, rural electrification and lighting of dangerous intersections.

Adequate wiring and range installation committees held separate meetings and are reported elsewhere in these pages. The highway lighting committee, of which I. W. Borda is chairman, seeks to work out a uniformity of policy with respect to its approach to the problem, utility executives being of the opinion that the state highway commission should initiate any activity.

Originally created to dispel misconceptions in regard to fluorescent lighting, the committee headed by G. C. Tenney declared that it will direct its efforts toward bringing basic illumination principles to the attention of fixture manufacturers and will seek with national agencies to have all units power-factor corrected. More fixture manufacturers will be invited to participate in the work of the committee.

Adoption of the unsafe electrical appliance ordinance as a state law may be sought by the code and ordinance committee at the next session of the legislature. It was suggested too that changes desired in the uniform code by individual inspectors be cleared through the whole committee and if sound and desirable, be incorporated in the uniform code itself for all cities having adopted it.

Anticipating intense competition from liquid petroleum gas in agricultural, domestic and even industrial fields, the committee on this subject, headed by G. C. Delvaille, California Electric Power Corp., will make a report on a study it is making at the forthcoming fall conference.

Air heating will be made the subject of a university study to determine the economic practicability of all types of air heating. Industrial reconversion, G. N. Hawley, Southern California Edison Co., informed the guidance committee, needs most the training of personnel to meet customers' reconversion problems. He was instructed to prepare an analysis and make recommendations to the board of directors for such a committee on training. Rural electrification, it was declared, is best channeled through the Committee on the Relation of Electricity to Agriculture, which has a long and successful record of constructive work. Local displays at various locations at which farmers may see actual equipment at work were recommended.

For the fall conference various possible program subjects were discussed, among them that an analysis of various sales recruiting and training programs be made and the results given to the conference. Store modernization plans will also be reviewed. Chairman H. C. Rice and Vice-chairman B. W. Reynolds, General Electric Supply Corp., San Francisco, will present such an analysis.

Fall Conference
Fresno, Dec. 7-8

For the first time since the war, PCEA will be able to hold a joint conference of both northern and southern members. It will be held at Hotel Californian, Fresno, Dec. 7-8, all day Friday and Saturday morning. The Operating Economics and Business Development sections and a part of the Administrative Services Section will hold parallel sessions on a program to be announced later.

Range Installation

Interrupted by a telephone call announcing that Japan had agreed to surrender, the range installation committee of the Business Development Section nevertheless made headway. Chairman M. G. Sues outlined its purpose as that of developing a plan under which dealers could quote an installed price on electric ranges.

It was unanimously agreed by the committee, which was augmented by representatives of several municipal utilities, that the biggest obstacle to range sales was the necessity of making two sales, one of the range, and another of the wiring.

Various aspects of the problem discussed were: Variance in local wiring codes and the need for standardization on an universally accepted wiring method, variance in power company allowances toward the cost of range installations and the need for uniformity there, how to determine the pro rata cost of installation among utility, manufacturer, distributor and dealer and how much should be charged the customer, and establishment of a list of contractors in each area who would participate in the program.

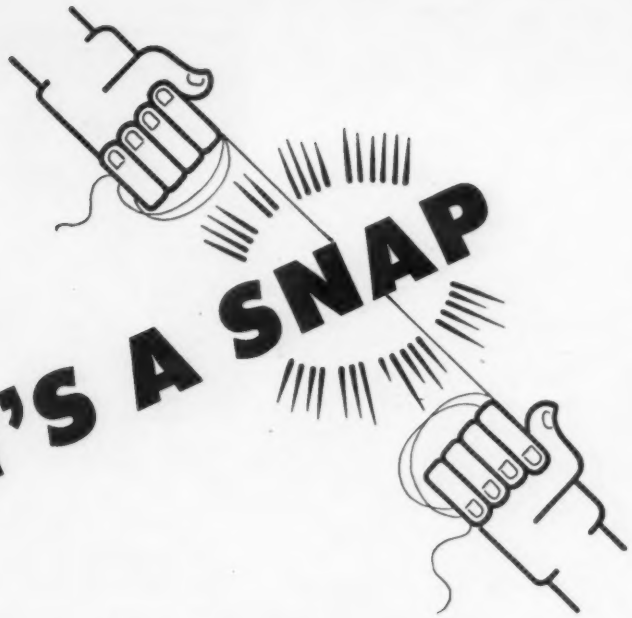
Adequate Wiring

With two objectives, the adequate wiring committee of the Business Development Section held meetings in Los Angeles and San Francisco late in August under Chairman Elbert Kramer, Westinghouse Electric Corp., and R. Graham Holabird, National Electrical Products Corp., vice-chairman. These objectives are: To obtain modern standards of adequacy in homes built during the war through an aggressive rewiring campaign. To overcome the acceptance of inadequate wiring development during the war and create a new public demand for more adequacy.

Specifications for bringing up the adequacy of wiring in NHA Title VI houses have been prepared and submitted to NHA for approval and for circularization to purchasers of such homes (See p. 113). Immediate action is being urged by some power companies toward the promotion of rewiring campaigns, using these specifications as a basis for "packaged price" sales to Title VI owners. Banks have indicated a willingness to finance such rewiring on long-term contracts.

Both the Red Seal and the National Adequate Wiring emblems will be combined in future wiring promotional programs, it was decided, in order to derive all the tangible value possible from previous promotional efforts and to make use of literature and sales helps prepared by the NAW Bureau. The committee plans a dramatized presentation at the fall conference, one that will bring forth the viewpoints of builders, contractors, architects and loan agencies.

Southern California Section IES heard Robert Frazer and Lars Moen of the Acra Instrument Co. at its September meeting. Subject was the Acra system of increasing light transmission by reducing reflections.



—to prove the "skin" value of Essex *EXTRA-TEST* Magnet Wire

● Before it leaves the plant, every spool of Essex Magnet Wire, #10 and finer, is checked with the *snap test*—a sudden, rapid stretch or elongation to the breaking point of the copper.

This *snap test* enables Essex engineers to prove the "skin" value (toughness, adhesion to copper, and flexibility of the enamel) so that the wire will wind into tight places and around sharp corners without damage to the film.

One more reason for Essex *Extra-Test* Magnet Wire's middle name—one more reason why it is specified so consistently for finer coil winding.

WIRE SX PRODUCTS

ESSEX WIRE CORPORATION
FORT WAYNE 6, INDIANA

Inspectors Gather

Code discussed at briefed single-day meetings

Dillingham Larson Gerber Siddall McFadden

INSPECTORS had tough luck with their meetings this year. The Southwestern Section, International Association of Electrical Inspectors had to split its annual meeting into two, one in Los Angeles, Sept. 19, the other in San Francisco, Sept. 21, after shifting dates because of the advancing of the dates for the meeting of the Electrical Committee, NFPA, in Chicago, to Oct. 8. The Northwestern Section, on the eve of its intended meeting in Longview, Wash., received word it could not be held, and Secretary W. L. Gaffney shifted gears quickly to hold at least an executive committee meeting and election of officers in Seattle, Sept. 24.

Only two meetings, therefore, prior to the Electrical Committee meeting to revise the National Electrical Code, were those of the Southwestern Section. IAEI President L. P. Dendel, Michigan Millers Fire Insurance Co., Lansing, Mich., and Secretary-Treasurer Victor H. Tousley, National Fire Protection Assn., attended both California meetings and went on to Seattle to meet with the Northwestern Section executive committee. All meetings were briefed to a single day.

Jesse Ross, chairman, Southern California Chapter, opened the Los Angeles meeting, called for the annual report of Secretary H. G. Ufer, and turned the meeting, held in Southern California Edison Co. auditorium, over to E. E. Larson, city electrician, Riverside, president of the Southwestern Section. Reports were heard from Secretary-Treasurer Harold L. Gerber, chief inspector, San Francisco. President Larson and President Dendel gave their addresses, the nominating committee made its report and officers were elected, and then the entire remaining time was given to Tousley in which to discuss various controversial issues proposed in revising the Code, in order to get an expression of inspector opinion on these points.

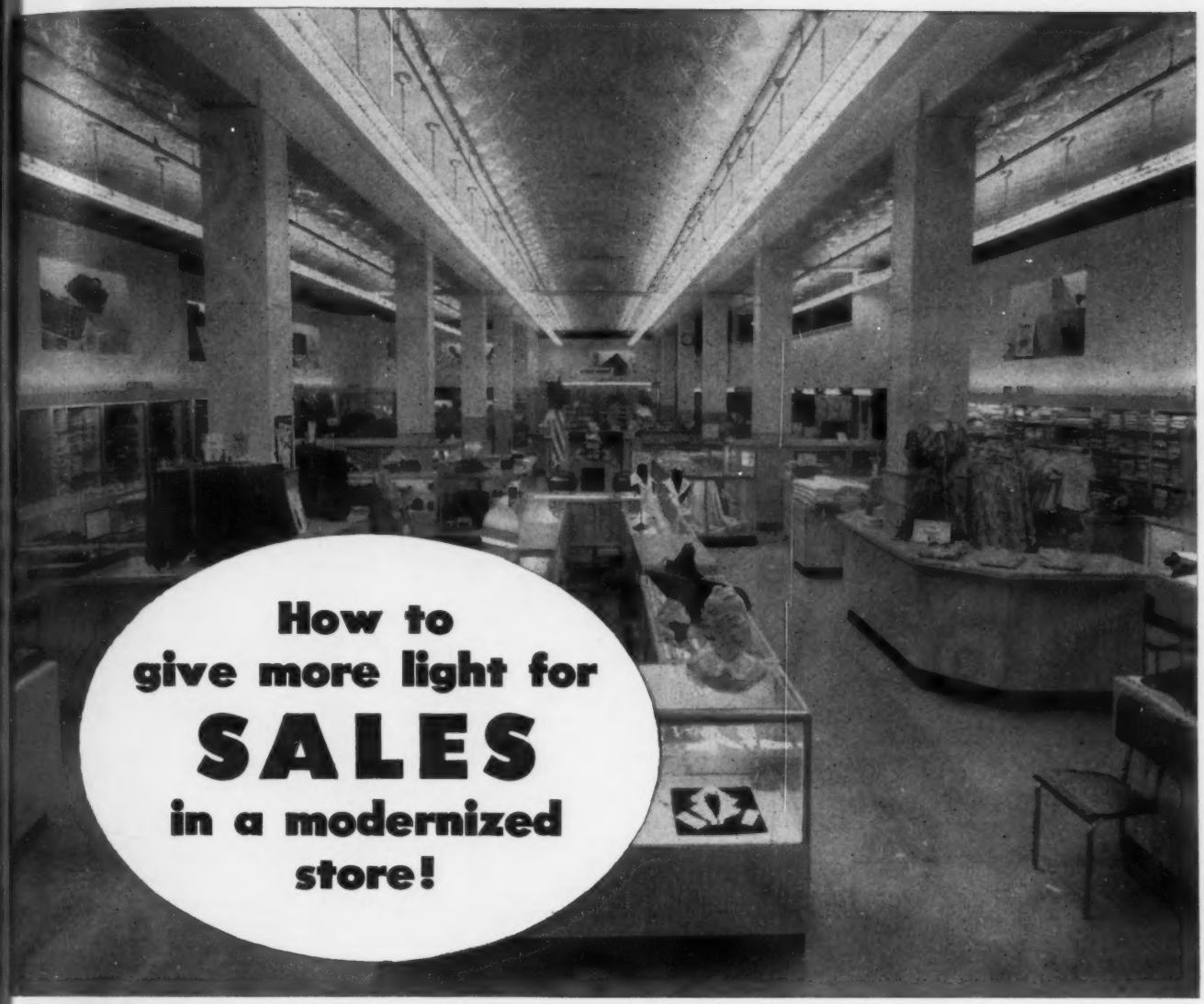
H. C. Romick, chairman, Northern California Chapter, did much the same at the San Francisco meeting, held at Pacific Gas and Electric Co. auditorium. Fortunately there was no contest in the election, the officers moving up in line or being re-elected. Succeeding E. E. Larson as president of the section will be M. C. Sandles, chief inspector, Oakland. H. G. Ufer, Western superintendent, Underwriters' Laboratories Inc., becomes first vice-president; H. E. Moore, electrical inspector, Modesto, second vice-president; H. L. Gerber was re-elected secretary-treasurer. On the executive committee, in addition to the officers, will be E. E. Larson, O. D. Butterfield, electrical inspector, Torrance, and J. A. Hill, Pacific Gas and Electric Co. Ben C. Hill, superintendent of the electrical division, Oakland, was elected to the IAEI executive council and R. H. Manahan, retired, as representative on the Electrical Committee, with B. C. Hill as alternate.

In his presidential address at both meetings, Dendel termed the IAEI a service organization whose purpose was the exchange of ideas so that, as individual inspectors, better service may be rendered the public. He sketched the history of electricity and its increasing service to mankind. Electrical inspection, he said, has had a setback during the war because of shortages of materials and manpower. The association has a big job before it in the education of the public to the need of electrical inspection. He urged inspectors to hold Code discussion meetings even if it took spare evenings, as it could do so much to teach the newer electrical wiremen who have entered the industry in the past few war years.

Tousley took various proposed revisions of the Code contained in the Article Committee reports, discussed their meaning and invited comment and discussion. On several he asked for votes of opinion. Some criticism of synthetic wire insulation was expressed at the Los Angeles meeting which was not echoed at the San Francisco meeting. The new Code would permit its use for all uses where Type R wire formerly was approved. Criticisms were that the insulation is off center, difficult to pull in and out of conduit, that the wire is stiffer and that it runs when in a warm location being a thermoplastic.

Prudhomme Moore Neighbor

Gerber Ross Ufer Larson Tousley



How to give more light for SALES in a modernized store!

Wanted:

Inviting, inconspicuous, overall modern light. Lighting as smart and pleasing as the modernized Griswold section of Strouss-Hirshberg's Warren, O., store.

Problem:

A minimum of structural change was desired. The ceiling had many irregularities. And a low balcony indicated the use of shallow units.

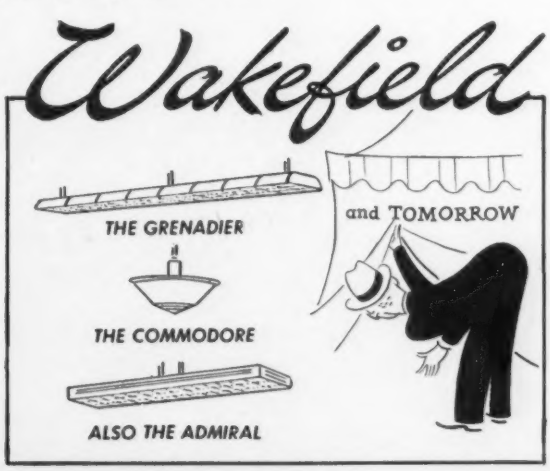
Solution:

Continuous rows of Wakefield GRENADIERS (No. PG-2488) to provide good selling light on merchandise and cheerful, pleasing light on walls and ceiling for greater eye comfort in the store.

Since GRENADIERS can serve as a wiring channel for conduit, a minimum number of outlets were necessary. The hanging flexibility of these units made it easy to compensate for slight ceiling irregularities. And their shallow depth permitted GRENADIERS to be used on the low balcony and in the low area below it, as well as in the main store space.

Your customers may have different problems; need different fixtures. But you can be sure of this: Wakefield will be glad to work with you for engineered lighting to fit. The F. W. Wakefield Brass Co., Vermilion, Ohio.

Are your customers throwing away DOLLARS?
Proper lighting maintenance—cleaning fixtures and walls and relamping—can double or triple their light. Urge them to get the lighting value they pay for. It's important to you!



NEWS of the industry

USBR SUBMITS PLAN FOR CENTRAL VALLEY BASIN

A development program calling for expenditure of $735,510,000 in California's Central Valley Basin within 15 years has been proposed by the Bureau of Reclamation in a 300-page report recently sent to Washington. Containing the immediate 15-year program and a long-range plan, the report includes multi-purpose dams, reservoirs, canals and power plants for irrigation, protection from salt water of San Francisco Bay, power generation and miscellaneous uses.

The immediate program would add approximately 1,000,000 acres to irrigated areas of the Sacramento and San Joaquin valleys by 1960 and would complete initial features of the Central Valley Project now under construction. Hydroelectric features proposed in the 15-year plan, with those now under construction, would provide nearly 1,000,000 kw. in generating capacity.

Ultimate development, including completion of facilities now under construction and those contemplated in the 15-year program, calls for expenditure of approximately $1,800,000,000, including dams and storage reservoirs, $849,600,000; canals and distribution systems, $529,500,000; power facilities, $389,700,000.

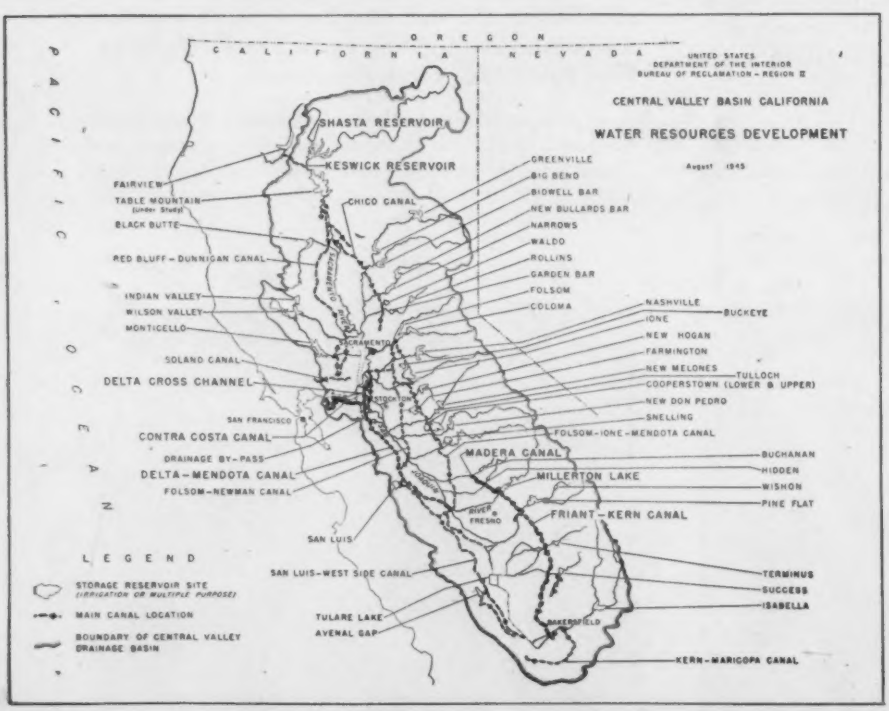
Power generation from the completed development is expected to be 8.1 billion kilowatt-hours annually. Monetary benefits are estimated at $275,003,000. With annual costs of $99,730,000, the ratio of benefits to cost is 2.7 to 1.0, according to the report.

Before it is sent to Congress, the report will be submitted to the Secretary of War and Governor of California and must be approved by the Commissioner of Reclamation and the Secretary of the Interior. Copies are available for examination at USBR offices in the region.

Power plants included in the 15-year plan with capacity and cost, are: Pine Flat on the Kings River, 45,000 kw., $3,300,000; Monticello on the Putah, 25,000 kw., $1,700,000; Folsom on the American, 60,000 kw., $4,500,000; New Melones on the Stanislaus, 48,000 kw., $3,000,000; Tulloch on the Stanislaus, 20,000 kw., $1,500,000; Hot Springs on the Kern, 3,500 kw., $700,000; Bidwell Bar on the Feather, 104,000 kw., $5,500,000; Elbow afterbay on the Feather, 20,000 kw., $4,500,000; Sloughhouse, 16,000 kw., $1,500,000; Nashville on the Cosumnes, 18,000 kw., $1,500,000; Table Mountain on the Sacramento (Iron Canyon being considered as an alternative), 45,000 kw., $4,050,000; New Bullards Bar, North Yuba, 60,000 kw., $3,500,000.

● A RATE CUT applying to commercial installations at Portales, N. M., has been announced by the Southwestern Public Service Co., amounting to 10.1%, effective Oct. 1. The downward revision was approved by the public service commission.

Map shows dams proposed for ultimate development of Central Valley Basin



ICKES TO ASK FUNDS FOR SHASTA POWER LINES

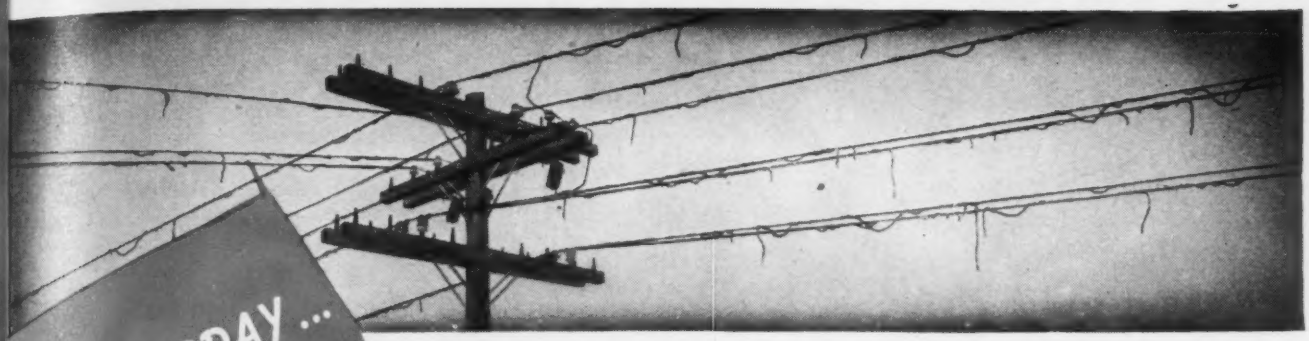
In a move which may force early decision in the controversy surrounding Shasta power distribution, Secretary of the Interior Ickes has stated that he will request funds for construction of government transmission lines to Roseville and other northern California towns applying for USBR service.

Given as the reason for the Ickes decision was an indication by Pacific Gas and Electric Co. that it would not wheel power to the city of Roseville recently signed by the bureau (EWEST September, p. 96). At present Reclamation has no line to move the energy to the municipality (the Oroville-Shasta line is about 60 miles distant) and no funds for construction of such facilities. Roseville's contract with USBR calls for delivery not later than Dec. 31, 1946.

Interior has several times sought to have included in its annual appropriation bill funds for a steam plant in the San Francisco Bay area with which to firm output of Shasta and Keswick and a network of transmission lines to distribute the government energy. A bitter fight last spring was settled without a policy decision when a Congress conference committee agreed to let the matter ride for the duration under the existing contract by which PG and E purchases Shasta output.

Although Roseville is the only city so far to reject a PG and E contract renewal and sign with the bureau, Reclamation has made offers to several municipalities. Meanwhile PG and E has asked Railroad Commission approval of ten contracts embodying a new rate schedule which it would make applicable to municipalities signing for five years. The proposed schedule is optional but offers rates about 10% lower in most cases for the five-year contract. Charge before the commission that the company was trying to undersell CVP power was exploded when it was stated that the new P-31 schedule represents only about one-fourth of the cut offered by the bureau, which, however, forces municipalities to pass on all savings to customers.

In Redding, where the city council signed a power contract with PG and E, a mandamus action to require a referendum on the contract has been instituted in superior court. Lodi and other towns who signed under the proposed Schedule P-31 were protesting before the commission the five-year term provision.



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"Festooning" was a common trouble . . .

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ANACONDA URC Weatherproof *stays put!* It assures a rugged, maintenance-free line. No coming apart—no festooning. Squarely back of Anaconda URC is Anaconda research, strict engineering control and testing. *Specify Anaconda URC Weatherproof.*

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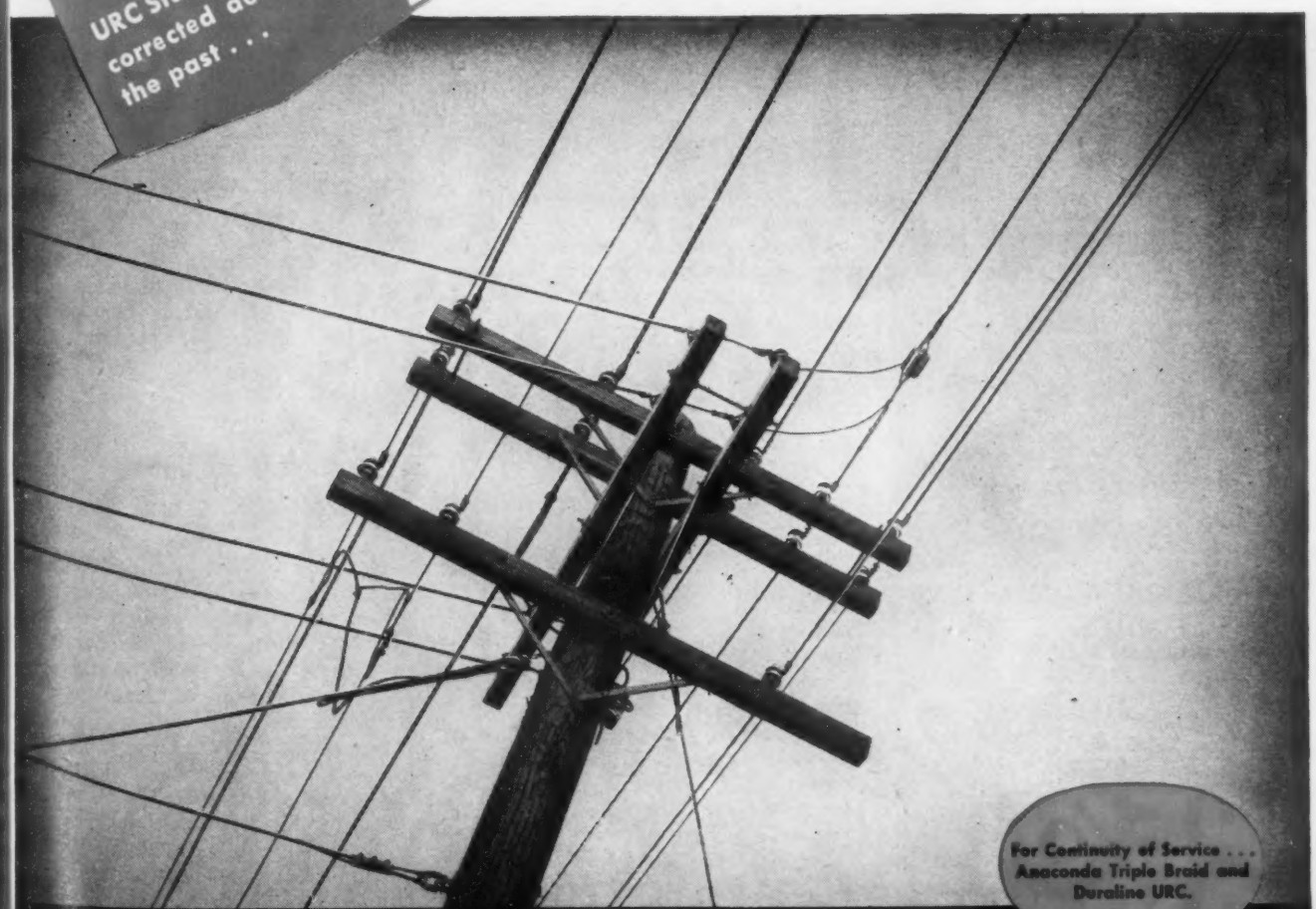

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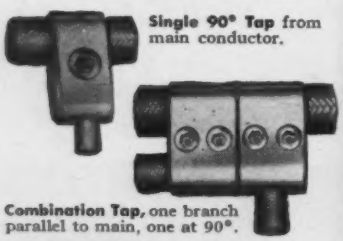
It's Easy to pick the right CABLE TAP— from the *Complete* line

You'll find the widest variety of parallel and 90° taps, combinations, and gutter taps—in a range of sizes up to 1,000,000 cm. Insulating Bakelite covers can be furnished for all types.



Single 90° Tap from main conductor.

Combination Tap, one branch parallel to main, one at 90°.

2-Way Gutter Tap.

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3-Way; continuous main and two separate branches.

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PUGET POWER SALE NOT SUBJECT TO POWER ACT

Removing one of the legal questions surrounding sale of Puget Sound Power & Light Co. properties to public power groups, FPC last month ruled that the company is not a "public utility" within the meaning of the Federal Power Act. As a consequence it dismissed a company application for authorization to sell all its electric properties and to issue notes in the amount of $15,125,000.

The order dismissing the application held that with the exception of certain "war-emergency" transactions which do not make the company a "public utility" under the meaning of the act, Puget Sound does not own or operate facilities for the transmission or sale at wholesale of electric energy in interstate commerce. Thus, the proposed sale of its facilities is not subject to Section 203 and 204 of the Federal Power Act.

The company was granted a certificate of exemption from the act in February 1943, as a result of its interconnection with the Washington Water Power Co., the City of Seattle municipal system and the Bonneville Power Administration. The exemption, issued under Section 202 (d), was to extend until 90 days after cessation of hostilities and was based on war requirements. In addition, the company was later authorized to transmit and receive energy to and from Canada for specific purposes.

In commenting on the company application, President Frank McLaughlin stated that it was not to be construed as an indication that any action whatever had been taken on the recent PUD purchase offer.

"We have been trying for years to get the commission to determine whether we came under its jurisdiction," McLaughlin said. "We are not engaged in interstate commerce, but we were formerly the subsidiary of a holding company, so there always has been some confusion on the subject. All that we are doing now is to ask the commission to clarify the situation, but we are compelled to give them a concrete case to get a declaratory judgment.

"The reason for the question about the notes is that, if we did sell the property, we would be compelled to borrow this sum to redeem the prior preference stock."

● ELECTRIC heat will be used in new homes to be built for government workers at Coulee Dam, the Bureau of Reclamation has reported. Beside benefiting the dwellers, the installations will conserve other fuel supplies and give the government a partial return for its investment in the two 10,000-kw. station-service generators which supply the area, USBR officials said. Although these generators probably will take care of the demand, additional electricity can be supplied from the main bank of 108,000-kw. units, it was pointed out.

Cooperatives Sign for Bonneville Power

Long-term contracts for Bonneville power have been signed by the Hood River and Walla Walla electric cooperatives, according to announcement of H. R. Richmond, Jr., manager of the PBA Mid-Columbia District office. The Hood River contract calls for initial delivery of 750 kw. of firm power and the Walla Walla contract for 300 kw. Both contracts provide for increase as needed to meet load requirements.

A 3,000-kva. substation will be constructed by Bonneville at its present substation site near Hood River and the co-op has stated that it will invest about $90,000 in distribution facilities to serve initially 356 members. The Walla Walla cooperative expects to construct distribution facilities to serve approximately 700.

The co-ops will purchase power under Bonneville's E-2 wholesale rate schedule, which provides a development period of four years during which the cost of power will not exceed 3½ mills per kwh.

Both groups plan to finance construction through sale of bonds, largely to local buyers. Walter Wells is president of the Hood River co-op; Charles Baker, of the Walla Walla co-op.

State High Court Upholds Utility Property Sale

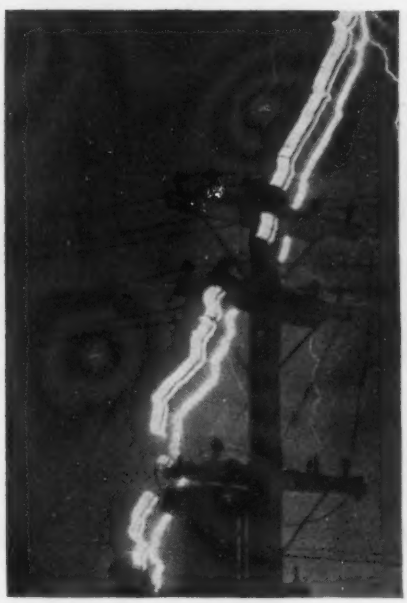
Refusing to allow return to the city of Clovis in eastern New Mexico of utility properties it sold to the New Mexico Utilities Co. in 1925, the State Supreme Court recently upheld a district court decision legalizing the transaction.

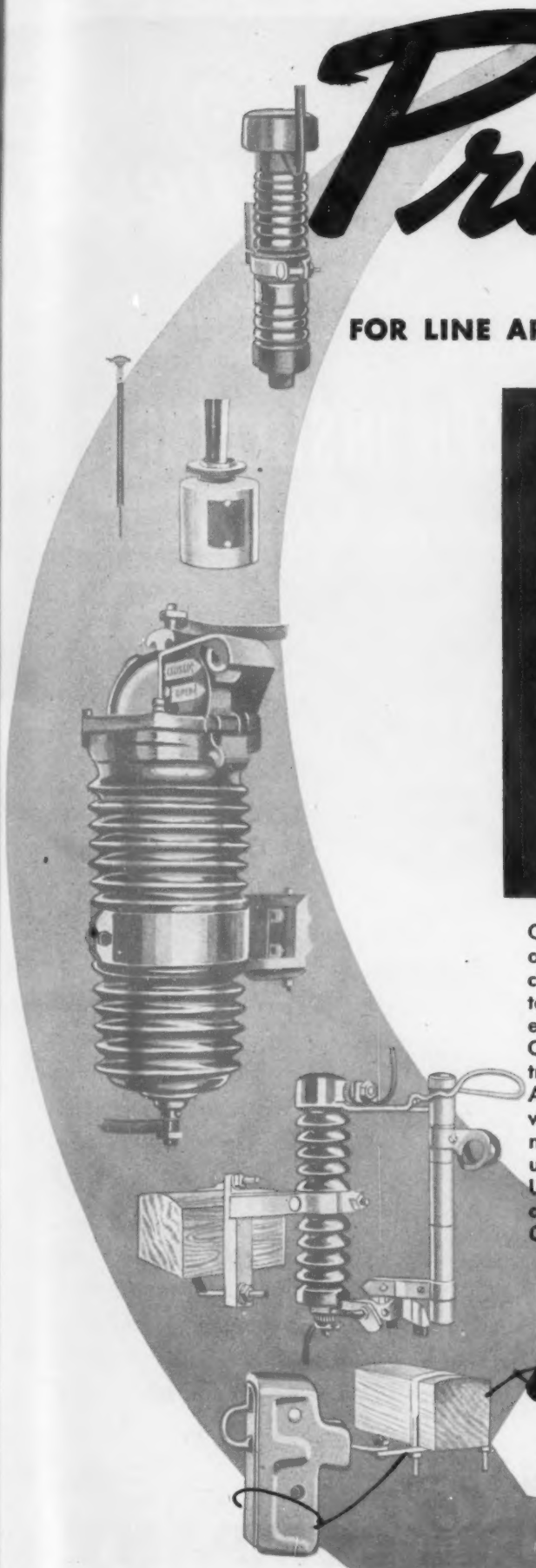
Legality of the 20-year-old, $400,000 sale had been challenged by Clovis city officials, who asked return of the properties, on grounds that it was generally violative of the state constitution and that sale of electric and water facilities should have been submitted separately to voters.

Southwestern Public Service Co. now operates the Clovis utilities, having acquired them from their predecessor, New Mexico Utilities Co.

Protection

FOR LINE APPARATUS, METERS, AND SERVICES...





Graybar can supply protective devices for the vital points throughout your system: (1) G-E lightning arresters for low-voltage power circuits, secondary and primary distribution systems, and high-tension transmission lines — neutral and insulating gaps; (2) G-E enclosed, indicating, and drop-out fuse cutouts — fuse links; (3) G-E circuit breakers — self-resetting outdoor oil circuit reclosers — tripping current transformers.

A nearby Graybar Outside Construction Specialist is ready to work with you in supplying adequate protection for your lines. Our nationwide network of warehouses assures fastest delivery possible under today's conditions.

Use Graybar's convenient service also for first-quality poles, crossarms, hardware, strand, insulators, pins, tools. *Graybar Electric Company, Graybar Building, New York 17, N. Y.*

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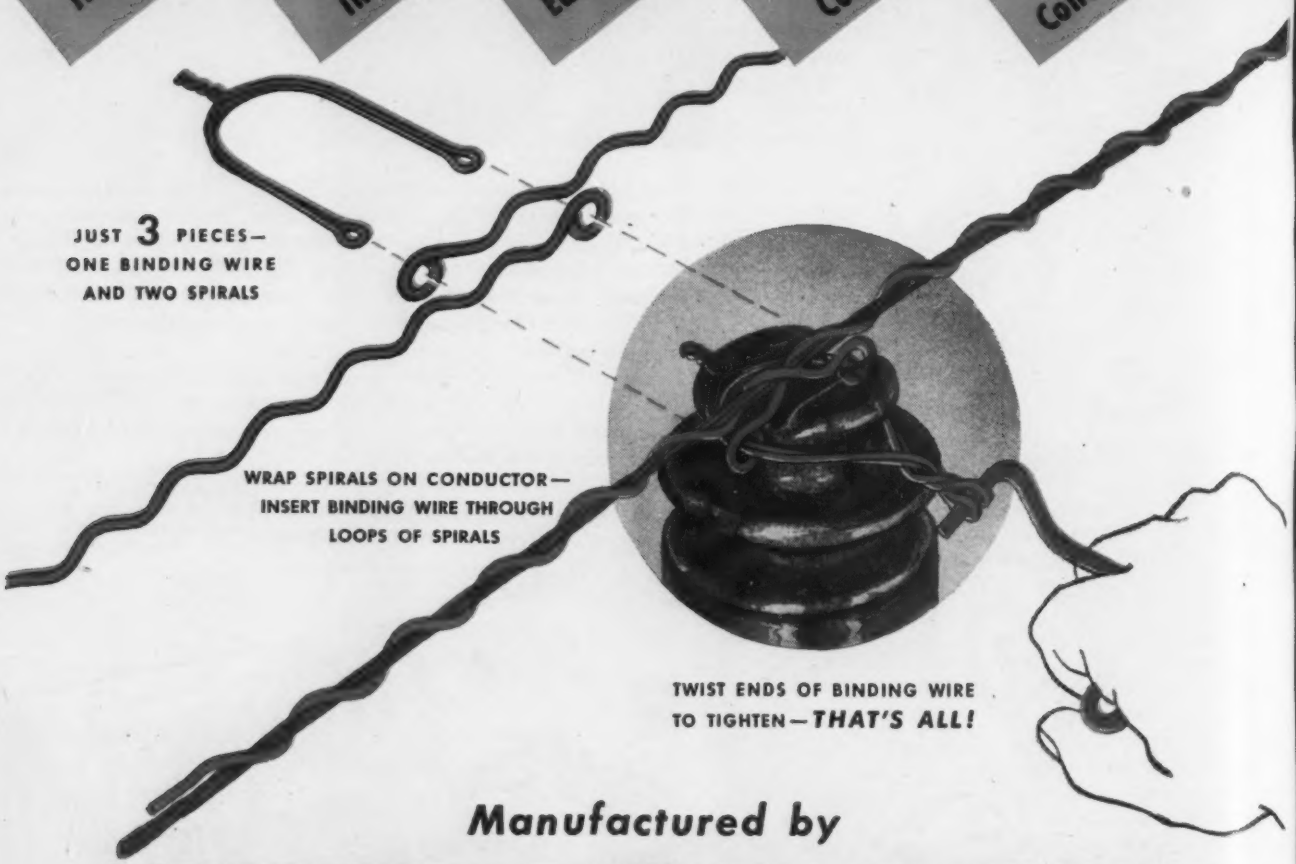

JUST 3 PIECES— ONE BINDING WIRE AND TWO SPIRALS

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TWIST ENDS OF BINDING WIRE TO TIGHTEN—*THAT'S ALL!*

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Glassport, Pa.

Builders and operators of overhead power lines will welcome the new Copperweld Grip-Flex 45 insulator tie—simple, inexpensive and easy to install. Enables every lineman to do a uniform tying job because it substitutes for uncertain care and skill the machine precision of a few factory preformed parts.

Copperweld Grip-Flex 45 is the ideal insulator tie for Copperweld and Copperweld-Copper Conductors, for both top and side tying. It provides a floating support for the conductor—the reinforcing wires keep the conductor away from the insulator. The binding wire does not touch the conductor. Strong holding power against unbalanced line tension is assured. *These ties fully meet the requirements of the National Electrical Safety Code.*

Copperweld Grip-Flex 45 is new—but not untried. Extensive tests in Copperweld's laboratory show this tie to be a distinct improvement over hand wrapped ties. It takes less time to apply—develops greater holding power—increases conductor life—and assures uniformly good results.

Write today for complete details.

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That's where Levolier Switches come in. In tests they have taken over 168,000 pulls — on and off — without trouble or a miss. Over a lifetime of actual service. Levolier switches are hand assembled and individually tested, and listed by Underwriters' Laboratories.

Use them in Fluorescent installations, individual light, or F. H. motor control. They are made in 3 to 10 ampere capacity, single pole, two circuit, series multiple and three way pull. Ask your Electrical Wholesaler about Levolier Switches . . . Switch to Safety.

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MANUFACTURING CO., INC.
Electrical Division
VALPARAISO, INDIANA

ARIZONA POWER'S BOND ISSUE IS AUTHORIZED

To effect consolidation of the Arizona Power Corp. of Prescott and the Arizona Electric Power Co. of Flagstaff, the Arizona Corporation Commission has issued the recently formed Arizona Power Co. a permit to sell $2,300,000 in 3½% first mortgage bonds, $400,000 in 4% serial notes, 12,000 shares of 5% cumulative preferred stock and 10,000 shares of common stock.

The securities total $4,900,000. The $400,000 worth of notes are to be repaid in 12 years, after which retirement of the bonds, due by 1970, will begin with a one per cent sinking fund being set aside each year.

Under the Arizona Power Co.'s article and by-laws, James C. Tucker, Austin, Texas, investment banker and president of the two merging companies, will continue as president, holding 9,076 shares of common stock, but if the company fails to pay preferred stock dividends for four consecutive quarters, the preferred stockholders may elect a majority of the board of directors and gain control of the company.

Tucker entered the northern Arizona utility field two years ago, purchasing all the stock of the Flagstaff company for $775,000, on which he later received a refund of $19,000 after adjustments. Later he acquired a controlling interest in the Prescott company and purchased a small utility at Winslow, merging it with the Flagstaff firm. His total investment was $2,312,000 but, with the consolidation of all these holdings under the Arizona Power Co., he will receive back all but $319,000 of that investment.

The consolidate company, with a book value of $6,997,000, will serve most of northern Arizona and will sell wholesale power to several municipalities.

B. C. Commission Acquires Additional Properties

The B. C. Power Commission has taken over the Columbia Power Corp. and its subsidiary, the Columbia-Vanderhoof Power Co. The reason it was not acquired at the same time as the Nanaimo-Duncan Utilities Ltd., and West Canadian Hydro, in the North Okanogan, was because of all the work involved in such an undertaking, according to the announcement of Forrest L. Shaw, commission member.

As a result of a motion recently passed by the city council of Prince Rupert, B. C., that city will ask the commission to take over the Northern British Columbia Power Co. This company has for years supplied electricity to the city, and it has been suggested that the commission deliver power to the city limits, the city itself to distribute within the municipality.

Utility Asks Approval on Tucson Purchase Proposal

Arizona Edison Co. has made application to the Arizona Corporation Commission for approval of its plan to acquire properties of Tucson Gas, Electric Light and Power Co., a subsidiary of Federal Light & Traction Co., for a price in excess of $8,500,000.

The move was described by Phillip B. Shaw, president of Arizona Edison, as an effort to place ownership of the Tucson utility, second largest distributor of electric power and natural gas in the state, in the hands of Arizona people. Federal Light and Traction has been ordered to divest itself either of the Tucson properties or its properties in New Mexico.

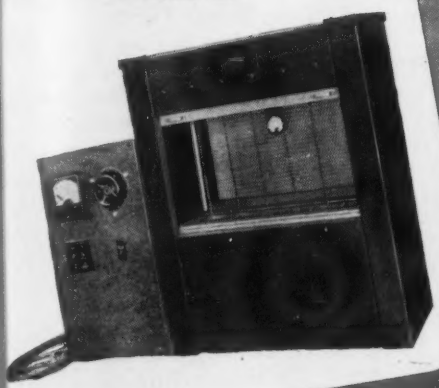
The city of Tucson also is trying to buy the plant. Tucson voters, after turning the proposition down once, voted again on the issue about a year ago and authorized its city council to make the purchase. However, the city and Federal Light and Traction have not been able to arrive at a sale figure, the company asking $9,100,000. As a result of this price disagreement, the city filed condemnation proceedings against the company several months ago in U. S. District Court at Tucson. These proceedings are pending and the city is determined to go through with them despite the proposed sale to Arizona Edison.

Sale may be delayed several months, Shaw said, as a result of failure of the Arizona Commission to grant an immediate hearing on its petition for approval of the purchase plan. The commission, declaring it must have time to study the proposal to determine if it conforms to Arizona law, set the hearing for Oct. 15. Shaw pointed out that Arizona Edison's contract with Federal expires Oct. 24.

Arizona Edison also asked the commission for permission to float a $2,500,000 loan in Arizona through sale of 4% promissory notes to future stockholders, the notes eventually to be redeemed with stock, in order to provide a good faith trust fund so it can go ahead with the deal. It proposes to buy the 147,000 shares of common stock of the Tucson company for $5,000,000, refund $3,500,000 in first mortgage bonds and pay Federal Light and Traction sums equal to unbilled accounts as of the date of sale and the net income transferable to surplus for the period May 1 to the date of sale.

Some Time-saving Testers

GLOVE TESTER--20,000 VOLTS A-C



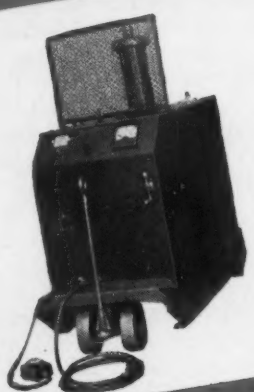
A QUICK, SAFE WAY TO TEST RUBBER GLOVES

This glove tester consists of two sections which fit together as a unit: a glove testing cabinet, and a high-voltage a-c power supply (which can be used separately, if desired, for general-purpose testing).

The glove-testing compartment, which contains a water tank in the lower section, is provided with supports for simultaneous testing of six standard linemen's rubber gloves. Contact with the water inside the gloves is made by chains hanging from a high-voltage bus which is solidly supported on insulators. A milliammeter connected in the high-voltage circuit indicates the leakage current in a glove when one of the six control buttons at the top of the cabinet is pushed.

This set, which operates on 115 volts, 60 cycles, fully meets all requirements of the National Safety Council for this class of testing. For complete information, write for HB-5112, page 101.

PORTABLE TEST SET--100,000 VOLTS A-C



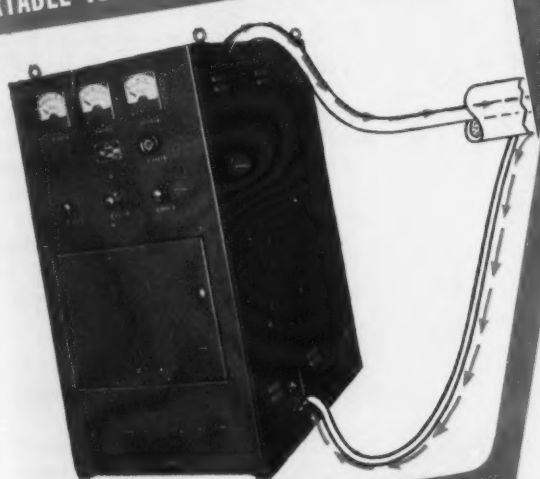
MAKES IT EASY TO TEST HARD-TO-MOVE EQUIPMENT

This completely self-contained, sturdy, a-c equipment has a rating of 10 kva, making it suitable for testing large, high-voltage equipment such as transformers, circuit breakers, bushings, and short lengths of cable.

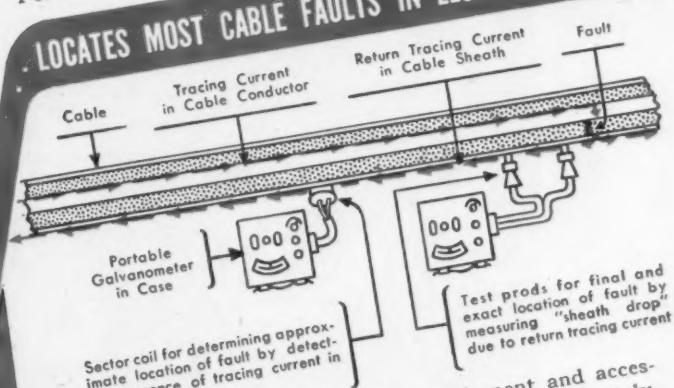
The voltmeter is highly accurate throughout the complete range up to 100,000 volts, at all loads and power factors, thus permitting precision measurements of the applied voltage.

Approximate dimensions are 5¾ by 2½ by 6 feet. Operates on 230 volts, 60 cycles. For safety, release of a floor switch, which must be held down during test, instantly de-energizes the set. For more information, ask for HB-5110, page 121.

D-C CABLE-FAULT SET



LOCATES MOST CABLE FAULTS IN LESS THAN 1 HOUR


Cable
Tracing Current in Cable Conductor
Return Tracing Current in Cable Sheath
Fault
Portable Galvanometer in Case
Sector coil for determining approximate location of fault by detecting presence of tracing current in conductor
Test prods for final and exact location of fault by measuring "sheath drop" due to return tracing current

This d-c set includes all the equipment and accessories required to locate faults quickly and accurately.

The set is used at the station, first to reduce fault resistance, then to transmit a d-c tracing current, which can be followed out along the cable with an exploring coil and galvanometer. Write for Bulletin GEA-3687B for complete data.

APPARATUS DEPT., GENERAL ELECTRIC COMPANY, SCHENECTADY 5, N.Y.

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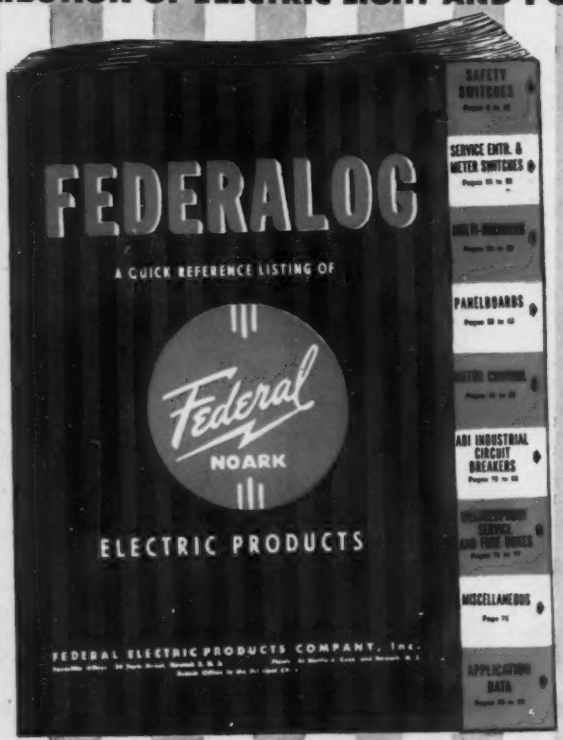

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BOULDER FIRM POWER SECURED BY CONTRACT

Under a contract approved by the Board of Water & Power commissioners last month, The Los Angeles Department of Water & Power, Southern California Edison Co. and the California Electric Power Corp. will secure all unused Boulder Dam firm power previously contracted for by the Metropolitan Water District. The agreement must be approved by the Secretary of the Interior and the Reconstruction Finance Corp. and the two companies.

The contract, which expires in 1987, makes secure for Los Angeles and other southern California cities hydroelectric power which otherwise could have been disposed of by the Secretary of the Interior to any interested parties. While insuring uninterrupted delivery to the three contractors of large supplies of low-cost energy for years to come, the contract will also increase total revenues of the Metropolitan Water District by some $25,000,000 during the period involved.

Under the original allocation of Boulder firm power, the district was obligated to take annually 1½ billion kilowatt-hours of electric energy. Currently, it uses only about 10% of this amount.

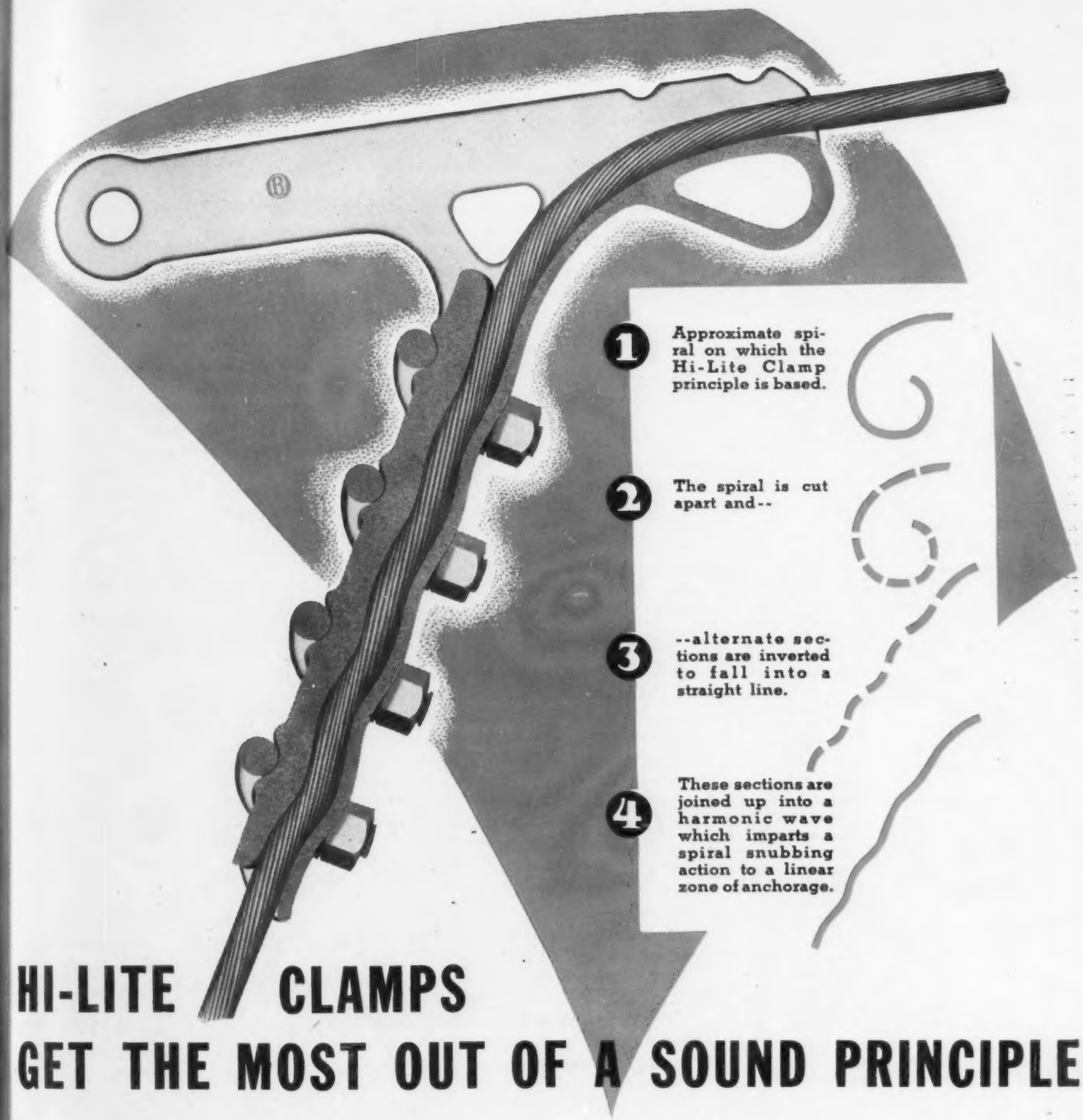
When the contract is approved by all six parties, it is estimated that there will be available to the three utilities about 1,358,000,000 kwh. of power annually, of which the department will receive 55% or around 750,000,000 kwh.; Edison Co. 40%, and California Electric 5%.

The amount of firm energy available each year to the utilities will diminish as the district utilizes additional electric power for pumping and incidental purposes.

Present cost of Boulder firm power is set at 1.244 mills per kilowatt-hour, but delivery to the utilities will be at a much lower rate during a development period for creation of outlets for resale. For the first five years of the contract, cost to the department and the two private concerns will be successively, 40, 50, 65, 80 and 95% of the established rate.

● RATE REDUCTIONS submitted by three New Mexico electric power companies, resulting in an aggregate annual saving of $14,500 to most classes of light and power customers, were approved late in August by the State Public Service Commission.

The El Paso Electric Co., Mesilla Valley division, the Southwestern Public Service Co., Clovis and Pecos Valley divisions, and the Inland Utilities Co. were the companies to voluntarily make application for reducing rates.


1
Approximate spiral on which the Hi-Lite Clamp principle is based.
2
The spiral is cut apart and--
3
--alternate sections are inverted to fall into a straight line.
4
These sections are joined up into a harmonic wave which imparts a spiral snubbing action to a linear zone of anchorage.

HI-LITE CLAMPS GET THE MOST OUT OF A SOUND PRINCIPLE

O-B HI-LITE CLAMPS have been compared to a vise with kid-glove jaws, because they grip the conductor with a hold that will develop the full strength of the cable, yet do it so gently that you can scarcely see where the clamp has been attached.

This is accomplished by utilizing a spiral snubbing action--one of the most efficient mechanical advantages known to physics. Because a spiral would be unhandy on a pole top, it has been developed into a harmonic wave; but it retains all of its original holding power. We have sketched how this is done.

The jaw or keeper piece of an O-B Hi-Lite Clamp does not act with the crushing force of a vise jaw, but rather performs like the hand that holds a rope snug to a snubbing drum. Hence, the lack of cable deformation.

There is a lot of sound design in an O-B Hi-Lite, just as there is a lot of satisfactory service and long conductor life. Specify these clamps on your next line job.

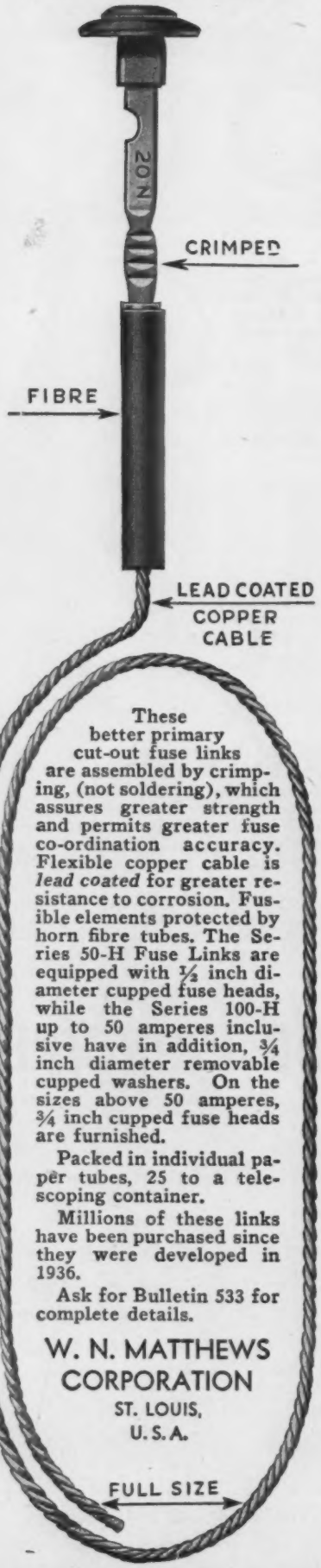
2610-H

Ohio Brass

MANSFIELD, OHIO

CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONTARIO

50-H AND 100-H MATTHEWS FUSE LINKS



These better primary cut-out fuse links are assembled by crimping, (not soldering), which assures greater strength and permits greater fuse co-ordination accuracy. Flexible copper cable is *lead coated* for greater resistance to corrosion. Fusible elements protected by horn fibre tubes. The Series 50-H Fuse Links are equipped with ½ inch diameter cupped fuse heads, while the Series 100-H up to 50 amperes inclusive have in addition, ¾ inch diameter removable cupped washers. On the sizes above 50 amperes, ¾ inch cupped fuse heads are furnished.

Packed in individual paper tubes, 25 to a telescoping container.

Millions of these links have been purchased since they were developed in 1936.

Ask for Bulletin 533 for complete details.

W. N. MATTHEWS CORPORATION
ST. LOUIS, U. S. A.

NORTHWEST COMPANIES PAY BIG TAX BILL

The stockholder-owned, business-managed electric utility companies operating in the Pacific Northwest states of Idaho, Montana, Oregon, Utah and Washington, paid in 1944 $27,487,990 in taxes. Of this grand total, $16,295,138 went to the federal government and $11,192,852 went to states and their local taxing agencies.

These facts were disclosed in a survey of electric utility company taxes for 1944 in those states, compiled by Berkeley Snow, executive secretary, Northwest Electric Light & Power Assn., and released Sept. 6.

Of the $16 million federal taxes, $13½ million were paid in income taxes, nearly $2 million in the form of the electricity sales tax, while social security taxes, capital stock taxes, and various miscellaneous taxes, fees, and licenses, absorbed the balance. Of the state taxes paid, $7,283,733 were for taxes on the operating properties of the reporting companies.

Snow points out that a comparison of the survey just released with a similar one covering utility taxes for the year 1941, revealed a marked increase in federal taxes. While state and local taxes fell off 1.98% during the past three years, total federal taxes increased 74%, from a little more than $9 million in 1941 to more than $16 million in 1944. Among state and local taxes, state unemployment taxes were down, and municipal franchise or occupation taxes were up in the same period.

The survey entailed compiling the taxes of 22 so-called private electric utility companies operating in the five-state areas. Public or governmental power enterprises and electric cooperatives are not included in the survey. All the large and medium-sized companies and several small companies are included, though a number of companies classifying as small are omitted. The compiler estimates that more than 99% of the total taxes paid by private utility companies in the area are tabulated in the results.

● ELECTRICAL WORKERS in the San Francisco area went back to a 40-hour week Sept. 15. Under the terms of the contract between Local Union No. 6, IBEW, and the San Francisco Electrical Contractors Assn., the five-day, 40-hour week carries with it double time for overtime. Oakland contractors and union had previously come to the same decision.

● FINAL APPROVAL by the SEC of the purchase by Gerald L. Schlessman, Denver utility man, of the Sheridan Electric Co., Sheridan, Wyo., signalized immediate construction work. It will extend present distribution lines to rural areas not now served and form a connection with another small utility recently added to the Schlessman portfolio.

Energy Use in Washington Told in Utilities Report

Families in Washington state spent $42.87 per family for electrical energy during the 12-month period ending March 31, 1945, as compared to $42.42 for the previous corresponding period, according to Andrew J. Zimmerman, director of public utilities.

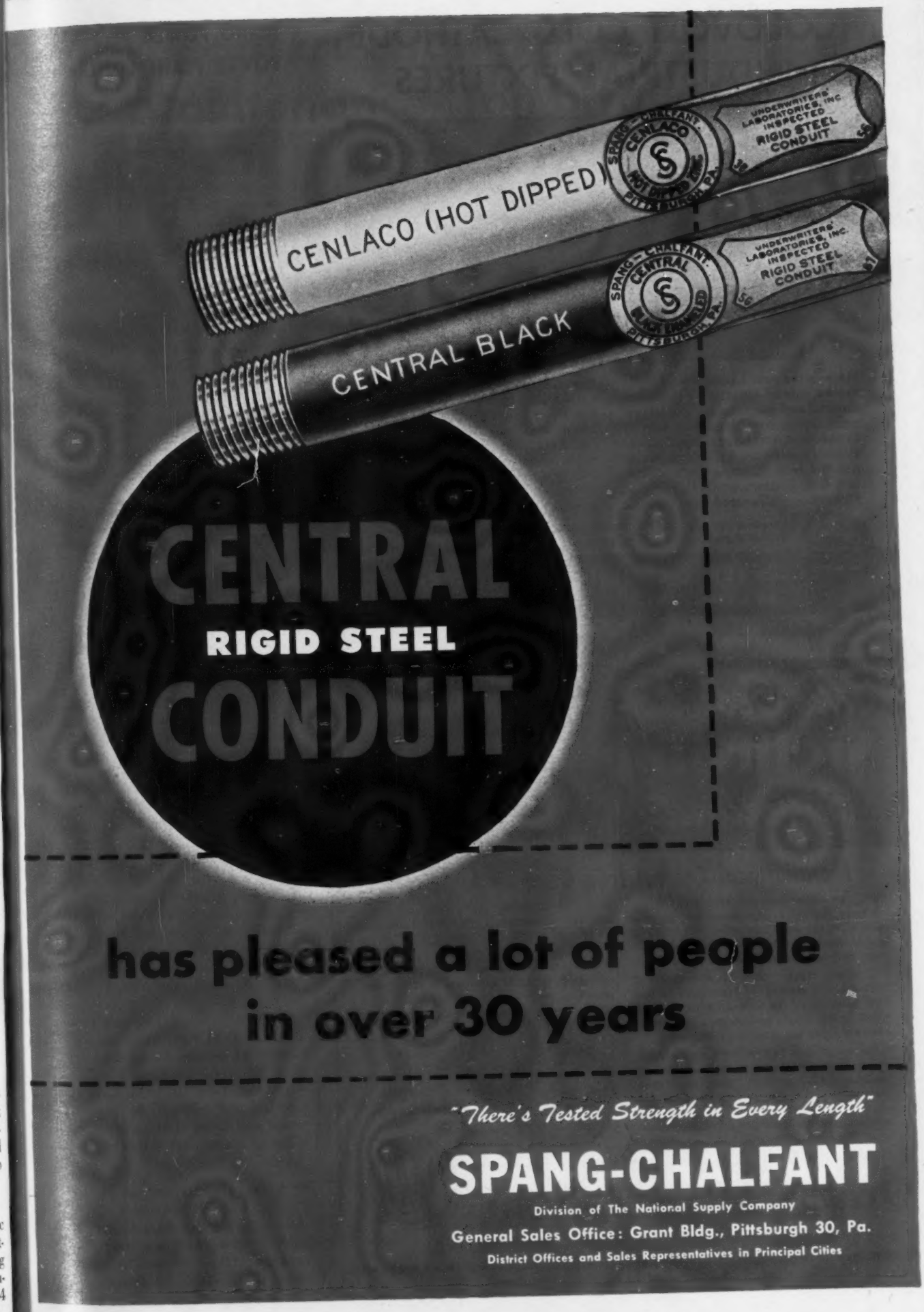
For the last month of the period power companies received $6,007,609 for 907,022,401 kwh. sold to residential and industrial consumers. This was nearly a million dollars more than the March 1944 figure. However, power company revenues were only about $4,000,000 higher for the complete year. This figure, Zimmerman pointed out, does not include power sales by the Bonneville Administration to Aluminum Co. of America, Reynolds Metals Co. and other industrial users. These concerns paid $1,097,414 for 417,034,604 kwh. used during March.

Zimmerman's report showed income to private and public owned companies to be nearly equal. However, electrical energy sold by the publicly owned utilities about doubled that of the private companies, as indicated by March deliveries, Zimmerman said in his report.

● RETROACTIVE pay increases totaling $122,000 were awarded to approximately 1,100 union and white collar employees of the San Diego Gas and Electric Co. in September. Covering the period from August 1944 to August 1945, the increase was in the form of a 4% blanket bonus, with the checks averaging between $90 and $150. Company officials stated the increase does not continue into the 1945-1946 year. War Labor Board approval for the increase had been sought by the company during the past year.

● W. S. MCCREA, Tacoma, Wash., engineer, has been hired by the Clark County Public Utility District to survey properties of the Portland General Electric Co., which the PUD seeks to condemn through legal action.

● INTERMOUNTAIN Rural Electric Assn., Littleton, Colo., has been granted $225,000 of REA funds including $87,500 to acquire existing power facilities. The co-op has let an $18,564 contract to A. B. Reither, Englewood.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Here is the new Colovolt industrial fixture, one of a complete line of industrial and commercial "packaged" units. Equipped with the standard 93" Colovolt 10,000 hour lamp, Colovolt fixtures may be used singly or in continuous line lighting in multiples of 8 feet. Instantaneous starting, no flickering, guaranteed for 1 year except for failure due to breakage are extra advantages of the Colovolt Cold Cathode low voltage fluorescent lamp. The long life expectancy of Colovolt lamps may be realized even when constantly turned on and off, and *pre-scheduled re-lamping, with no loss of production or time, is now possible with Colovolt installations.*

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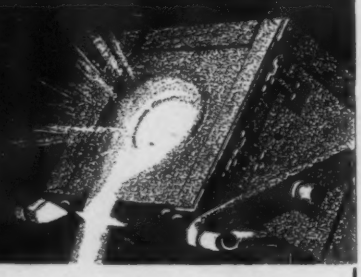

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TO produce genuine Nichrome takes more than the combining of the two metals Nickel and Chromium. It requires highly specialized techniques to make this superior heat and oxidation resisting alloy.

Through every stage of manufacture, from the first melting of the metals to the final spooling of the finished wire, precise metallurgical checks and controls operate to assure the peerless quality of Nichrome.

These exclusive Driver-Harris quality controls represent 45 years of continuing alloy research. No wonder, therefore, that Nichrome is the time-tested standard by which other electrical resistance alloys are measured. Although there are many excellent nickel chromium combinations there is *only one Nichrome . . .* and it is made *only* by Driver-Harris.

For full technical information regarding D-H Nichrome write for Data Book R-42. It will be a valuable addition to your reference files.

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IDAHO POWER AWARDS POWER PLANT CONTRACT

As the first step in its $4,000,000 construction program announced earlier in the year, Idaho Power Co. has awarded contracts for a new power plant at the Upper Salmon site near Hagerman on the Snake River, substation facilities and 120 miles of transmission line. Morrison-Knudsen Co. of Idaho received the contract award and work was expected to start in September.

The 16,500-kw. power plant comprises units No. 3 and 4 of the development started in 1931, with installation of a diversion dam across Snake River west of the Owsley Bridge on U. S. Highway 30. A canal below the dam and the power house at Upper Salmon were completed in 1937.

The 138,000-volt transmission line will extend from Hagerman Valley electric plants to Boise and Emmett. Substations or switching installations are scheduled for Lower Salmon, Boise, Emmett and Mountain Home.

Completion of the transmission line as far as Boise is expected by April, 1946, and to Emmett sometime in July 1946. The power plant is scheduled for completion by October 1946.

Commenting on the company program, President C. J. Strike stated: "Idaho Power Co. and its staff have been participating actively in a program of research for the development of natural resources and industry, working jointly with the mining, lumbering and agricultural industries of the Snake River valley. As rapidly as any need for electric power over and above the existing supply develops, we are ready to move immediately to provide it."

Strike said that it was also planned to build farm extensions to remaining areas unserved by electricity. It is estimated that more than 90% of farms in southern Idaho and eastern Oregon are served, he pointed out, and the company intends to come as near 100% as possible within the next few years.

H. H. Obermiller, formerly electrical contractor of Los Angeles, will be in charge of power house and transmission line construction for Morrison-Knudsen. Lou Steelman is general supervisor in charge of power house work and Tom O'Mara general supervisor of transmission line construction.

● FIRES were caused on 197 poles in Pacific Gas and Electric Co.'s Oakland district when the season's first rainfall soaked dust- and soot-covered lines, causing leaks. Several square blocks were illuminated by flashes on some of the poles.

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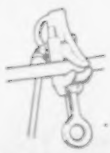
Less Maintenance Tomorrow



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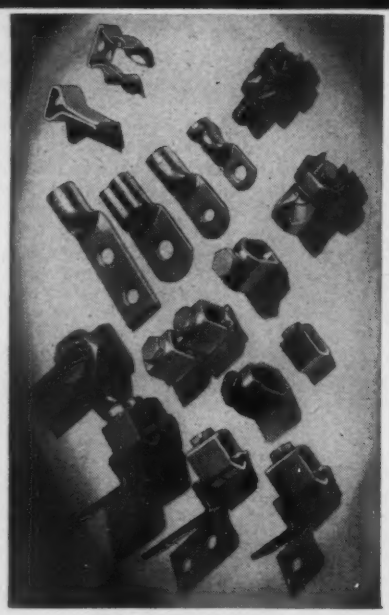

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ENGINEERS REPORT ON FOSTER CREEK PROPOSAL

A report on the proposed $87,000,000 Foster Creek Dam on the Columbia River was sent to Washington, D. C., last month, according to Brig. Gen. Philip C. Bruton, Pacific Division engineer, Corps of Engineers. The report will be reviewed by the Board of Engineers for Rivers and Harbors before presentation to Congress.

The dam, in the heart of the Big Bend country in north central Washington, would be 220 ft. high and of the concrete gravity type. It would have an installed capacity of 1,024,000 kw. and prime power of 500,000 kw. Normal power pool would be 937 ft. above mean sea level and 172 ft. above normal low water at the dam site.

The reservoir, expected to be 51 miles long with an average width of 1,200 ft., would furnish storage for water drained from an area of some 75,000 square miles. At normal pool elevation its capacity would be about 480,000 acre-ft.

Foster Creek Dam site has been the subject of a two-year survey supervised by Seattle District Engineer, Corps of Engineers, Col. Conrad P. Hardy.

USBR Estimates Output of Palisades Development

Building of the proposed $24,000,000 multiple-purpose Palisades Dam on the Snake River, where preconstruction work is underway, would make available 131,000,000 kwh. of firm hydroelectric energy and 20,000,000 kwh. of secondary power in eastern Idaho and northern Utah, it is estimated by the Bureau of Reclamation.

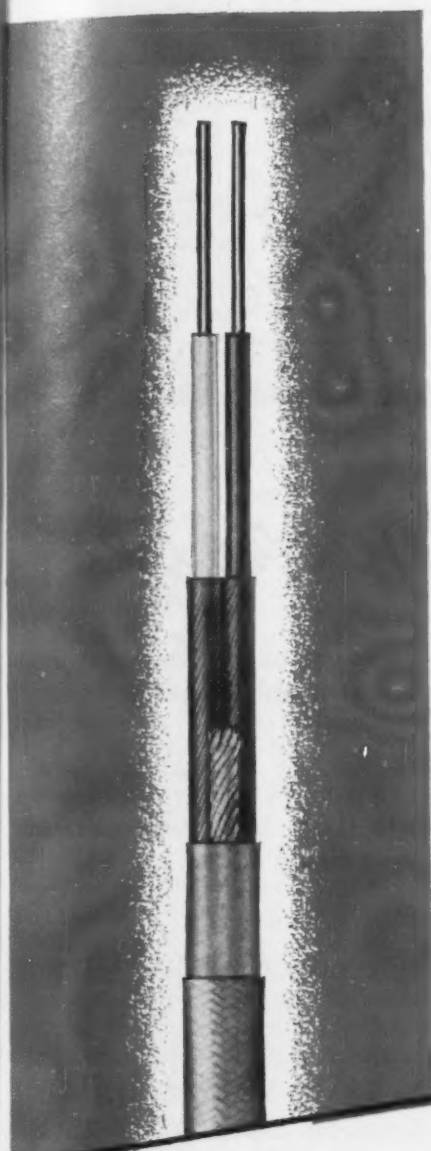
In addition to the proposed 260-ft. high earth and rock-fill structure, bureau plans call for a power plant with 30,000-kw. capacity and a 65-mile transmission line between the dam site and Grace, Idaho, connecting with lines of the Utah Power & Light Co.

● FERRY COUNTY Public Utility District, Republic, Wash., has received a $420,000 grant from REA funds. Part of this amount will be used for acquiring existing facilities.

● HOT SPRINGS COUNTY Rural Electric Assn., Thermopolis, Wyo., has been granted $37,000 in REA funds. CARBON POWER & LIGHT Co., Carbon, Wyo., has been allotted $50,000.

● MOUNTAIN EMPIRE Electric Co-op, Campo, San Diego County, Calif., has been granted REA funds amounting to $75,000.

General Electric Introduces



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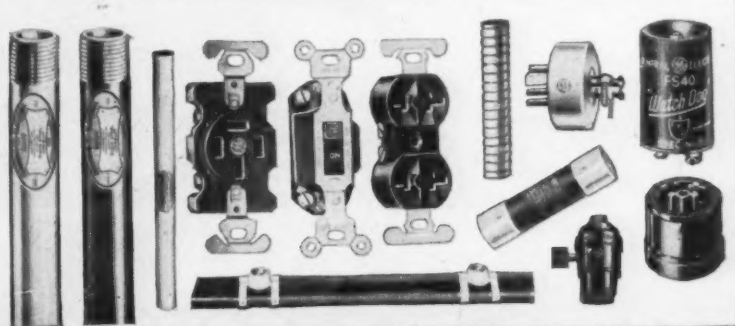

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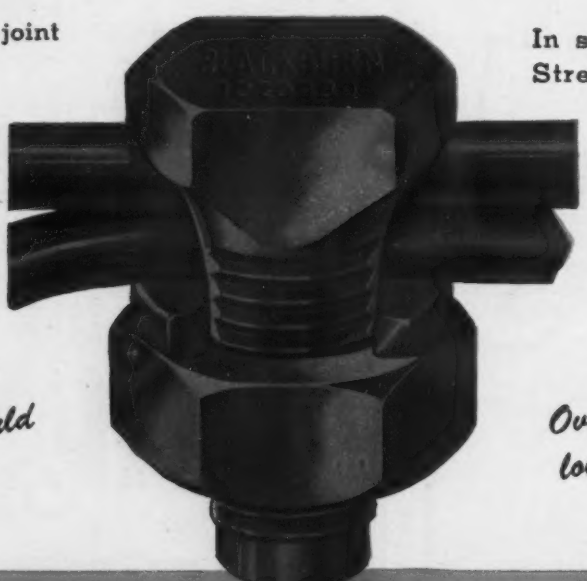

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LABOR *and* MANAGEMENT MEET— *for* PEACE *or* CIVIL WAR?

THE prospect of a knock-down and drag-out fight in the automobile industry does not augur well for the reconversion outlook, which upon every other score is bright. Any widespread outbreak of the type of industrial warfare which now threatens will disrupt, more thoroughly than anything else on the horizon, an orderly transition to a peacetime economy.

It is doubly unfortunate that there should be a general tightening of union and company battle lines upon the eve of the Labor-Management Conference, which on November 5th will convene at President Truman's direction for the purpose of "working out by agreement means to minimize labor disputes." If the current work stoppages occasioned by industrial conflicts should increase rather than diminish between now and November first, the Conference atmosphere hardly promises to be favorable to a dispassionate examination of basic issues.

Yet the shadow of the threatened industrial storm that hangs over the Conference only serves to emphasize the importance of reaching satisfactory agreement upon two problems with which such a Conference might deal. The first is that of determining what machinery shall be used for settling disputes upon which employers and workers have reached an impasse. The second, and more far-reaching, is that of arriving at some common understanding upon the major issues which commonly lead to irreconcilable disputes.

Settlement of Wartime Disputes by the War Labor Board

During the war the first problem was handled largely by machinery centered in the National War Labor Board. Supported by general adherence to patriotic pledges by labor leaders and employers not to resort to the use of economic force against each other during wartime, and backed up on rare occasion by use of the President's power to seize plants for war purposes when its orders were not obeyed, the Board managed, by what amounted to compulsory arbitration, to settle the nation's wartime labor disputes with relatively little economic loss.

But it can scarcely be claimed that the War Labor Board did much to resolve the issues from which disputes grow. Indeed, the fact that it was available to issue orders in cases which the Secretary of Labor certified as likely to "lead to substantial interference with the war effort", resulted in the conversion into full fledged disputes of many disagreements which would otherwise have been settled at a local level in the course of collective bargaining. Meanwhile, local collective bargaining machinery which should have been doing most of this work was neglected, and will need thorough reconditioning even to be brought back to its prewar level of effectiveness.

With V-J Day came an abrupt change in the status of the War Labor Board. One of its main props, labor's "no strike pledge", was promptly withdrawn. It could no longer rely on the President to use his power to seize plants for war purposes to force obedience to its orders. Consequently the Board agreed that it would accept new cases only if both parties to the dispute stipulated in advance that they would abide by the Board's findings, that it would clear its dockets of old cases as rapidly as possible, and that it would then go out of business, leaving to the Labor-Management Conference the question of what should take its place in the postwar period.

What Shall Take the War Labor Board's Place?

The immediate and pressing task of the Labor-Management Conference is to agree upon machinery for settling industrial disputes in the peacetime economy.

Neither management nor labor wants the continuation of compulsory arbitration to which they submitted as a necessary war measure. But it must be clear to everyone that if any substantial proportion of the disputes that inevitably arise are settled by resort to strikes and lockouts, economic anarchy will result. Not only will it be impossible to achieve the high levels of output and employment that have been set as postwar goals, but it is questionable whether our economy could survive. The only alternative to compulsory arbitration under government auspices is for management and labor to demonstrate their ability to effect a peaceable resolution of their differences without it.

The most obvious need is to set up local machinery at the grass roots where disputes originate. That is where most of them should be settled by local negotiation and, when that fails, through voluntary submission to mediation or arbitration under terms of reference to which the parties agree. Many issues, which at plant level are relatively simple in character, are blown up to formidable dimension and complexity when they are passed along

the line for decision in Washington. The centralizing process is one that frightens everyone connected with it because it focuses attention upon the possible importance of precedents established by a decision, rather than upon resolving satisfactorily the particular dispute at hand.

Unquestionably, some Federal machinery must be provided which may be called upon in cases where the size or implications of a threatened dispute clearly run beyond local jurisdiction. That will mean the thorough revamping of conciliation and mediation machinery which exists, but which has grown rusty through disuse while compulsory arbitration was the order of the day.

At least, this involves a complete overhauling of the United States Conciliation Service with a noteworthy strengthening of its personnel. There may be wisdom also in recently advanced suggestions for the creation of a board of arbitration to act in cases voluntarily submitted by the parties concerned, and for boards of inquiry to make reports upon the merits of disputes in which the public interest is concerned. But there is valid ground for questioning what appears to be the common assumption that such machinery should be located in the Department of Labor. It belongs neither there nor in the Department of Commerce. For the work which such agencies are called upon to perform, both the appearance and fact of complete impartiality are essential to effective performance. Assurance of impartiality will not be fostered by placing them in a department specifically charged by Congress with the task of advancing the interests of wage workers.

Resolving the Issues Over Which Disputes Arise

It may be, as many think, that the forthcoming Labor-Management Conference cannot effectively handle any problems beyond the procedural ones suggested above. If that is true, its agenda probably should be restricted to planning the reconstitution of collective-bargaining and dispute-settlement machinery, in view of the urgent need for putting it in working order.

But either in this Conference, or in subsequent ones, there will have to be an attempt to reach a reasonable measure of labor-management accord upon certain basic issues over which most industrial disputes originate. The best of machinery can be swamped if disputes are generated in ever-increasing number.

Most important of such issues is that of the fair determination of wages. There is clear need for reaching agreements at least upon the major factors on which such determination should rest. It seems evident that if we are ever to hope to reach the high levels set and generally accepted as postwar goals, we must harness economic incentives to promote production efficiency. That means that workers, as well as management, must be given a genuine stake in increased productivity. No universal formula is possible, but we should be able to agree upon general principles for dividing returns derived from improved performance in output between workers and investors, and consumers in the form of lowered prices.

Again, since unionism is here to stay, general acceptance by management of the principle of collective bargaining would save innumerable disputes which are concerned more with the method of negotiation than with the concession sought. Few in management still question the validity of the collective bargaining process as such, but there are many matters to be resolved of which the question of the open shop, the union shop, or the closed shop is merely a conspicuous example, upon which there is wide divergence of conviction between and within labor and management groups.

On the management side, there is sincere concern about the intent or ability of union leaders to exercise responsible control that assures compliance with contractural obligations. Wild-cat strikes are of sufficiently frequent occurrence to give substance to this distrust, and union discipline seldom has been administered in a decisive or effective fashion. The prospective rivalry of three competing labor organizations of national scope gives management little confidence that a bargain made and kept in good faith with any one of them provides assurance against work stoppages.

All of these matters, and many others, need thrashing out between management and labor, with the view of arriving at as large a measure of specific and detailed agreement as can be achieved. The greater the area of such agreement, the smaller will be the area for disputes that must be handled by settlement machinery, or put to the final test of force.

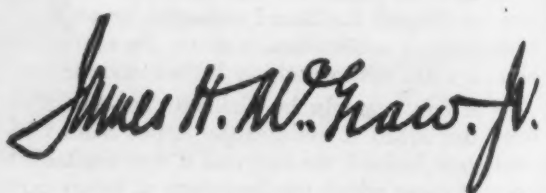
Peace or Civil War in Industry

The Labor-Management Conference is of major importance to national welfare. It is important even if it restricts its objectives to the procedural problem of how industrial disputes are to be handled.

It can make an even larger contribution if it lays the groundwork for an attempt to reach working agreements upon such policy issues as have been cited above.

Neither management nor labor can afford to lend anything less than their best intelligence and effort to an attempt to arrive at common understanding. Success will mean that we have a genuine chance of reaching new levels of economic well-being. Failure will mean industrial civil war, in which the casualties will be high. One almost certain casualty of such a war will be the principle of collective bargaining, since the Government can scarcely refrain from establishing compulsory arbitration if sufficient breakdown occurs.

It is to the vital interest of both management and labor to demonstrate that they can responsibly control themselves.



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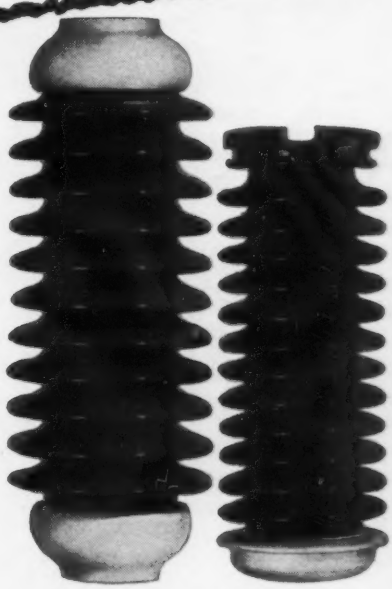

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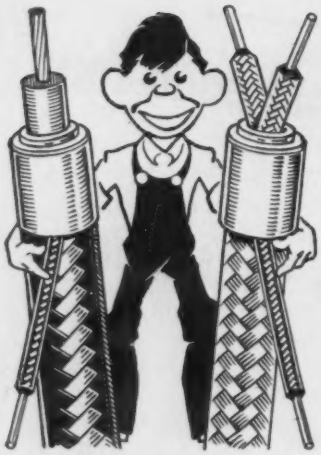

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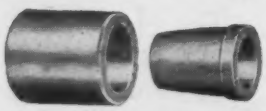

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HOFFMAN ASKS FUNDS FOR SEATTLE'S ROSS DAM

Transfer of war workers to peacetime construction is expected to speed completion of the second step in construction of Seattle City Light's Ross Dam. Superintendent E. R. Hoffman has asked the city council for an additional appropriation of $730,049, which will increase to approximately $13,000,000 the total cost of the new unit. Original estimate was $9,900,000, to which $3,300,000 was later added for tunnels, bringing the total to $12,200,000.

Except for an outright grant of $1,865,000 by the federal government, cost of the dam is being defrayed by sale of City Light utility bonds. Hoffman proposes that the $730,049 extra appropriation be taken from City Light's surplus, to be repaid from the proceeds of future bond sales.

Hoffman declares that the latter sum is required because of "broken rock" conditions, encountered on both banks of the river which were not disclosed by the preliminary excavations and drilling. Also it has been found advisable to change the spillway's surfaces from "flat" to "warped" construction. Of the sum required, $441,360 is for extra rock excavation, and Hoffman says that the overrun in cement and concrete resulting from the extra excavation amounts to $434,020 in cost, which will be paid from surplus funds in other budget items.

At the same time that he asked for the new appropriation, Hoffman turned back into the surplus fund, $656,652 of unused money, which is the total unused balance of various appropriations.

Ross Dam is being raised 180 ft. and will add 300,000,000 kwh. annually to the city's power supply.

San Diego Utility Starts Line Construction Work

Construction has started on 16.1 miles of 12,000-volt transmission line to furnish electric power for pumping water onto 9,000 desert acres in southern California near Borego, according to an announcement by San Diego Gas & Electric Co. officials. The Drury Electric Co., San Bernardino, Calif., was awarded the contract to build the line for the San Diego utility.

Wells averaging 650 ft. in depth recently drilled in the area have verified preliminary tests that water exists in sufficient quantities for extensive irrigation. Electrically powered deep-well turbine pumps ranging from 75 to 125 hp. will be employed to deliver 1,500 to 2,000 gal. of water per minute.

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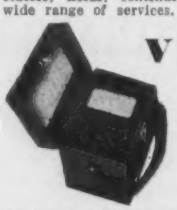

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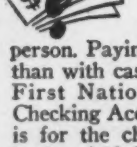

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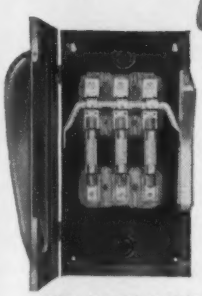

You take no chances when you install BullDog equipment in your plant. We "treat 'em rough" *before* they go to the customer.

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LOS ANGELES LAUNCHES CONSTRUCTION PROGRAM

Reports and estimates on projects to be started before July 1946 were filed in September by the Los Angeles Department of Water and Power with the water and power commissioners. Estimated to cost $26,500,000, the projects are the first in a $125,000,000 program of extensions and improvements announced by Manager Samuel B. Morris and expected to be completed in eight or ten years.

Some $10,700,000 will be expended by the power system by next June 30 and $6,000,000 by the water system. In addition, the power system will initiate $7,483,000 in work by that date and the water system $2,500,000.

Chief Electrical Engineer C. P. Garman reported that power system projects include a second 65,000-kw. unit at the new Los Angeles harbor steam plant, to cost $6,325,000; construction of a transmission line between Receiving Stations B and D, $2,313,000; expansion of Receiving Station F, $2,111,660, and construction of new substations in the West Los Angeles and San Fernando Valley areas, $1,559,000.

Nearly all contracts for equipment on the steam plant have been awarded or specifications are out for bids, it was reported. Construction work is expected to begin by Nov. 1.

Large quantities of poles and line materials have been purchased to provide for maintenance and improvements delayed because of the war. This work has begun, as well as similar work on the underground system, and will expand as more materials and men become available.

British Columbia Approves Hook Up with U. S. Power

Permission has been granted by the British Columbia government to the B. C. Electric Railway Co. for the construction of a new transmission line to hook up the U. S. government power system at Bonnington Falls with that of the B. C. Electric. The new transmission line will run from Everett, Wash., to Vancouver, B. C., at a voltage of 230,000. Transformer facilities will be provided at the B. C. terminal of the line.

The new arrangement is a temporary expedient pending the completion of the Bridge River project of the company. This will be started in 1946 and it is expected power will be available from this source in 1949. A route for the high-tension line from the Bridge River plant to Vancouver is now being surveyed by engineers.

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Above photograph shows actual corrosion test and equipment devised by Reliable engineers to best study this important test requirement

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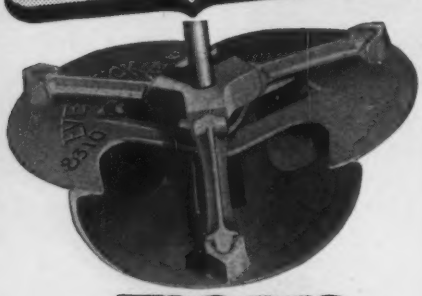

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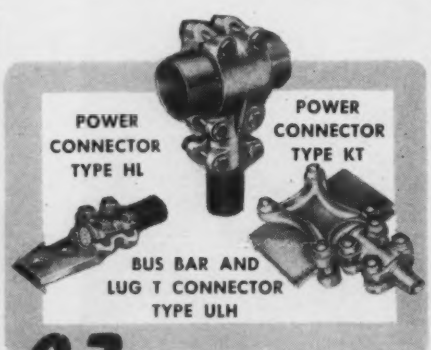

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220

REA REPORTS ON FUNDS AVAILABLE TO WEST

A total of $18,421,637 in REA loan funds was available in September to borrowers in the eleven Western states, according to an announcement from REA headquarters in St. Louis. This includes $11,561,596 allotted prior to May 1 but not advanced and $6,860,041 in new loans granted 30 borrowers since May 1 from $200,000,000 authorized by Congress for the fiscal year.

Total approved loan allotments currently available to borrowers in the area are: Arizona, $165,972; California, $640,488; Colorado, $4,153,108; Idaho, $810,870; Montana, $4,100,267; Nevada, $65,310; New Mexico, $1,742,956; Oregon, $3,391,112; Utah, $421,607; Washington, $1,503,307; Wyoming, $1,426,640.

Loans allotted since May 1 provide for the construction of 4,609 miles of distribution lines to serve 9,315 farms and other rural establishments in the eleven states. Announced goal is to bring electricity to 86,700 rural consumers in the area within three years after materials and labor again are generally available. It is estimated by REA that the three-year program in this region will involve an investment of $34,450,000 for construction of new lines, and $14,455,000 for improvements to existing power systems, construction of new generation and transmission facilities, and for relending to consumers for purchases of initial farm and household electric installations.

REA borrowers in Arizona are operating 632 miles of lines serving 2,236 consumers; in California, 1,502 miles serving 4,507; in Colorado, 7,045 miles serving 20,343; in Idaho, 3,083 miles serving 7,503; in Montana, 3,259 miles serving 7,764; in Nevada, 121 miles serving 461; in New Mexico, 1,362 miles serving 3,645; in Oregon, 2,838 miles serving 9,684; in Utah, 687 miles serving 2,455; in Washington, 6,120 miles serving 13,679; in Wyoming, 2,280 miles serving 5,893. This is a total of 28,929 miles of REA-financed lines serving 78,170 consumers in the eleven state area.

● The Continental Divide Electrical Cooperative has been organized in McKinley County, N. M. The co-op contemplates building 90 miles of system in Sierra County. Bids for this extension were recently rejected as too high, but new bids were to be considered Oct. 4.

● Lane County Electric Co-op, Eugene, Ore., has been allotted $350,000 in REA funds. These funds will be added to a previous allotment for building distribution and transmission lines and four substations.

CO-OP ASKS FUNDS FOR STEAM GENERATING PLANT

Application for REA funds to build or acquire a steam generating plant and transmission lines was authorized recently by the Plains Electric Generating Cooperative Inc., composed of nine REA co-ops in New Mexico, Colorado and Texas. The action was taken at a meeting of the organization in Las Vegas, N. M.

The plant would be built in the vicinity of the Colfax County, N. M., coal fields, where it is stated mines have been shutting down because of increased use of oil instead of coal as locomotive fuel by the Santa Fe Railroad.

Ultimately, however, the group plans to use hydroelectric power from dams proposed for the Rio Grande and tributary streams. According to John R. Mutz, Region 5 resident engineer for the Bureau of Reclamation, a potential of more than 120,000 kwh. of hydroelectric energy could be provided in New Mexico by projects already in existence plus several proposed ones.

Present dams are El Vado on River Chama, now used solely to store irrigation water, and Elephant Butte and Caballo on the Rio Grande, used for irrigation and power. Proposed projects are dams at Abiquiu and Guests on the Rio Grande, Chamita on the Chama, and a proposed project to divert part of San Juan River waters into the Rio Grande.

Oliver Kimbrough is manager-coordinator of the Plains Electric Generating Cooperative. Member organizations are: Farmers Cooperative, Clovis, N. M.; Roosevelt County Cooperative, Portales, N. M.; Bailey County Cooperative, Muleshoe, Texas; Mora-San Miguel Cooperative, Mora, N. M.; San Luis Valley Cooperative, Monte Vista, Colo.; Springer Cooperative, Springer, N. M.; Kit Carson Cooperative, Taos, N. M.; Socorro Cooperative, Socorro, N. M., and Central New Mexico Cooperative, Corona.

● A NEW REA cooperative has been formed at Wray, Colo., with approval of the local committee on a $350,000 project to serve the communities of Wray, Anton, Cope Lane, Vernon and Idalia in Yuma County. The over-all program contemplates an expenditure of $2,000,000 for the complete electrification of rural Yuma and Washington counties.

● CONSTRUCTION of a major Bonneville substation at Longview, Wash., started early in 1942 but halted because of shortages in manpower and materials, has been resumed. The $1,600,000 project includes construction of new transmission lines.

AUSTIN LEVELING BRIDGE
FOR SWITCHES AND RECEPTACLES

No. 1941

Here is a very inexpensive device that saves time and eliminates all the troublesome problems of leveling switches and receptacles with the surface of the finished wall so that the plates fit perfectly.

It positively eliminates broken or distorted plates and loose switches or receptacles. It is very common to go back to the job to mount the switch or receptacle plates only to find that the box is setting a bit crooked or it is too far back from the wall so that the receptacles do not line up with the plates. The Austin Leveling Bridge completely overcomes this problem.

It rests on the surface of the finished wall and the screws for the switch and receptacle pass through it and into the ears of the switch box. Therefore the receptacle is in perfect alignment for the plate. Ideal for concrete jobs where the boxes seldom come flush.

No matter how far back or how crooked the box may be the Austin Leveling Bridge makes every switch or receptacle fit perfectly with the plate and every plate fit perfectly on the wall. Made for single or two-gang outlets.

Above illustration shows a duplex receptacle mounted on the Austin Leveling Bridge. Note:—Receptacle is flush with wall surface and in perfect alignment for the plate.

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Austin Cat. No.	Type	Wt. Lbs. Per 100 Sets	Carton	Standard Package	NET PRICE PER 100 SETS Less Than 100 Sets	100 to 499 Sets	500 Sets and Over
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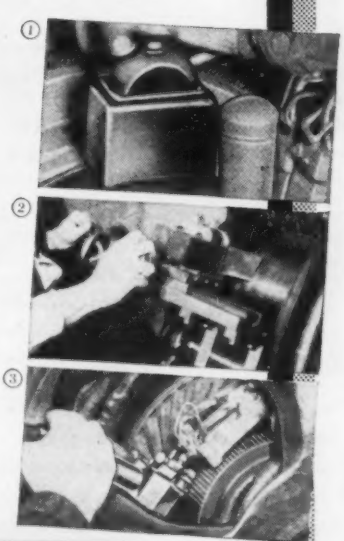

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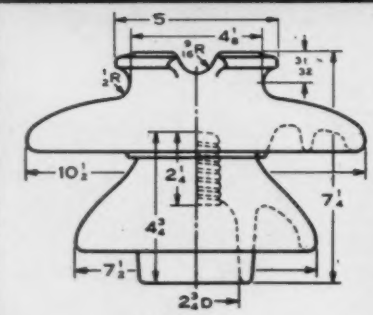

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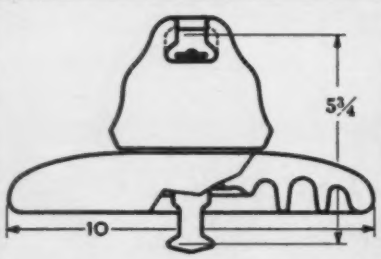
45 Kv. Rating
Dry Flashover . . . . . 125 Kv.
Wet Flashover . . . . . 85 Kv.
Rec. Pin Height . . . . . 8 In.
Std. Pkg. Crate 6

This insulator generally used on 33 Kv. can also be furnished in one-piece design (No. 1924). Mechanical, thermal and electrical characteristics are well balanced insuring long life in service.



NO. 21243
15,000 Lb. Min. Combined M. & E. Rating
Dry Flashover . . . . . 80 Kv.
Wet Flashover . . . . . 50 Kv.
Leakage Distance . . . . . 11½ In.
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This design is offered in a wide range of spacings in both Ball-Socket and Clevis types which fulfill all strain insulator requirements.

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CONSTRUCTION BEGINS ON GRAND COULEE MACHINES

Under revitalized contracts with the Bureau of Reclamation, Westinghouse Electric Corp., Woodward Governor Co. and the Newport News Shipbuilding and Dry Dock Co. have begun the postwar job of constructing parts for three 108,000-kw. generators for Grand Coulee Dam, USBR officials announced in mid-September. Installed price of the units will be about $2,000,000 each.

The three new generators will complete the power house on the west bank of the Columbia River below Grand Coulee and bring its hydroelectric output to the planned 992,000 kw. Installation is expected to be completed in 1948.

Treated Tamarack Poles Okay, Co-op Head Says

Tamarack poles are being used to carry electrical transmission lines of several Washington rural electrical cooperatives, it was disclosed in mid-September by V. P. Campbell, manager of the Inland Empire Rural Electrification Inc. Western tamarack, available in large stands in the Pacific Northwest, previously had been considered as fit only for fuel and other minor uses.

Experiments in use of western tamarack began over a year ago, when pole shortages threatened to halt construction of authorized rural lines near Spokane, Wash. It was found that western tamarack poles, when debarked and treated with creosote under same processes used for cedar poles, were satisfactorily resistant to decay.

A Spokane cooperative ordered 5,000 of the poles, the Big Bend cooperative 1,000 and the Prosser cooperative 1,000.

● A $425,250 CONSTRUCTION program was announced by California Electric Power Co. in September through its president, A. B. West. Included are a $210,000 line already under way from Garnet to Twenty-nine Palms, Joshua Tree National Monument and the Morongo Valley; extensions from Garnet to Banning, $30,000; from Barstow to Harper Lake, $58,000, and in San Bernardino County to Big Bear Lake, $50,000. Ferris Valley expansion will cost $33,500.

● CONTRACT has been placed by the British Columbia Power Commission with the Canadian Westinghouse Co. for the 25,000-kva. generator for installation at the $7,000,000 Campbell River power project. Contract for a 28,000-hp. turbine has been placed by the commission with the Dominion Engineering Co. Announcement of the awards were made recently by S. R. Weston, chairman of the commission, who stated that the generator would be delivered in 14 months.

Silver Used for Conductors Returned to U. S. Treasury

Forty million dollars worth of silver will be returned to the U. S. Treasury from the Mead aluminum reduction plant located in Spokane, Wash.

The silver, borrowed with the Reconstruction Finance Corp. responsible for its safekeeping, was used as a conductor in electrical installations at the plant when copper became a critical wartime shortage.

The Mead plant, managed during the war by the Aluminum Co. of America, is now temporarily closed and authorities believe the switch from silver to the now more plentiful copper is a step in preparing the plant for its sale or lease to a future operator.

CVA Information League Elects its Officers

Officials have been named to the newly created Columbia Valley Authority Information League, according to word coming from Boise, Idaho. Clayton Davidson was elected president, Arthur Lyon, secretary, and Pete Leguineche, treasurer. All are from Boise.

The league has as its purpose the "dissemination of facts and figures on the proposed Columbia Valley Authority which is aimed at developing water resources of Idaho, Oregon, Washington and part of Montana," Davidson said.

● WESTERN COLORADO POWER CO. has lost no time since lifting of the ban on materials essential to construction activities. Four projects to service new subscribers are in process or completed, according to Louis Baudino, district superintendent. Where wire now is lacking to finish three La Plata extension jobs, poles are being set by line crews.

● PEND OREILLE Electric Co-op, Newport, Wash., has approved an $86,312 construction contract with Agutter Electric Co. of Seattle. It includes labor and materials for 88.5 miles of line.

● MORA-SAN MIGUEL Electric Co-op, Mora, N. M., has approved a contract with Bridgeman Construction Co., Albuquerque, for construction of 185 miles of line. Contract amount is $191,521.

There are Switch and Circuit Breaker

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to meet your every need.

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No. 2
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Type C Condulet with Switch
Type FSQ Interlocking Safety Switch and Receptacle Condulet
Type C Condulet with Vaportight Switch
Type FS, Two-Gang Tandem Vaportight Condulet with Switch and Plug Receptacle
Type MSR Two-Gang Watertight Marine Interlocked Switch and Receptacle Condulet
Type DXE Condulet with Two Switches
Type GSB Three-Gang Vaportight Condulet with Switches
Type FST Threadless Condulet with Switch
Type FA Four-Gang Watertight Safety Switch Condulet
Type ZT Safety Switch Condulet
Type WMK Raintight Safety Switch Condulet
Type WMKS Raintight Safety Switch and Interlocking Receptacle Condulet
Type FS Condulet with Pilot Light, Switch and Plug Receptacle
Type FS Two-Gang Watertight Marine Switch Condulet
Type GRF Condulet with Switch
Type EFS Explosion-Proof Switch Condulet
Type FSC Vaportight Push Button Station Condulet
Type MSR Three-Gang Watertight Marine Switch and Receptacle Condulet
Type FHRC Mercury Switch Thermostat Condulet
Type FS Vaportight Push Button Station Condulet
Type FG Door Switch Condulet
Type YSW Vaportight and Weatherproof Circuit Breaker Condulet
Type DVS Dust-Tight and Vaportight Circuit Breaker Condulet
Type FDC Vaportight Secondary Breaker Condulet
Type FS Vaportight Condulet with Three Switches
Type FS, Five-Gang Condulet with Switches and Plug Receptacles
Type FS Three-Gang Condulet with Switches
Type WBR Weatherproof Circuit Breaker and Receptacle Condulet
Type FGCH Explosion-Proof Switch Condulet for Gasoline Bulk Stations
Type EMS Explosion-Proof Mercury Limit Switch Condulet
Type FSPC Explosion-Proof Switch Condulet with Threaded Cover
Type EGP Explosion-Proof Mercury Switch Condulet for Panel Mounting
Type FLDC Explosion-Proof Secondary Breaker Condulet
Type FLS Explosion-Proof Switch Condulet
Type EGP Explosion-Proof Push Button Station and Pilot Light Condulet for Panel Mounting
Type FSQC Explosion-Proof Interlocked Receptacle and Switch Condulet
Type GUB Explosion-Proof Motor Starting Switch Condulet
Type GUSC Explosion-Proof Line Starter Condulet
Type EFS Explosion-Proof Push Button Switch Condulet
Type HRC Explosion-Proof Mercury Switch Thermostat Condulet
Type EFSC Two-Gang Explosion-Proof Push Button Station and Pilot Light Condulet
Type EFD Explosion-Proof Motor Starting Switch Condulet
Type EFS Two-Gang Explosion-Proof Push Button Switch Condulet
Type HR Explosion-Proof Thermostat Condulet
Type EFSC Explosion-Proof Control Station Condulet
Type OFC Explosion-Proof Push Button Station Condulet
Type EFSC Explosion-Proof Triple Switch Condulet
Type EPC Explosion-Proof Circuit Breaker Condulet

Complete listings of each type are in Condulet Catalog No. 2500 or in supplementary bulletins.

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Electrical Porcelain.

TRADE notes

● APPLIANCE DISTRIBUTORS INC. is a new Denver firm which was already entrenched for postwar operations when VJ-Day dawned, as district representative for the Hurley Co. (Thor laundry equipment) and Colonial-Premier lamps, among other lines, for distribution to retail outlets. Pete Kanekeberg is vice-president and manager of Appliance Distributors. E. J. Carpenter is secretary-treasurer. Both are former Public Service Co. of Colorado employees. Appliance Distributors made a ten strike when it bought the B. K. Sweeney's parts department, acquiring essential Thor maintenance materials. The firm expects a shipment of Thor Automagics for the Christmas trade. It now occupies office space and warehouse facilities in the Wazee Market, 112 Wazee St., Denver, but expects shortly to move into new quarters, now in process of construction.

● FOWLER MFG. CO. of Portland, maker of electric water heaters since 1914, has completed a new plant in which it will consolidate its Portland and Spokane factory operations. The new plant is of streamlined design, is a block and one-half long, with floor space of 60,000 sq. ft. and a saw-tooth roof which allows maximum lighting. A modern continuous porcelain enameling oven is being installed to increase the plant capacity. According to P. L. Fowler, general manager, reconversion has taken place and the plant will be distributing water heaters as soon as materials and manpower permit.

● APOLOGY is made to Garland Affolter Co. of San Francisco for publication in the September issue, p. 142, of a news note to the effect that Wallace George would handle the Allen Bradley account in northern California. This item was inadvertantly picked up from trade gossip and not substantiated as it should have been, for which ELECTRICAL WEST is duly ashamed.

● ELECTRICAL SPECIALTY CO., San Francisco, has been appointed distributor for Dow Corning silicone materials. Electronic Mechanics Inc. "Mykroy" and Stupakoff Steatite products and Kovar hermetic seals.

● WARREN TELECHRON CO. now has Western headquarters in space 153-A at the Western Merchandise Mart. Joseph Burns is its Western manager.

● THE MONITOR line of electrical appliances, produced by 24 manufacturers and numbering 35 different lines, has affiliated with it as three of its Far Western cooperative distributors, the L. H. Bennett Co., of San Francisco; the Eoff Electric Co., at Portland; and Wilford Bros. for southern California, at Los Angeles. Other distributors who are to handle this line in the cooperative chain of distributors were organized by T. K. Quinn, former General Electric Co. lamp and appliance executive. Paul B. Zimmerman has resigned from Chrysler Airtemp Division to join his old Nela Park associate as executive vice-president of Quinn's organization.

● THE OTTO K. OLESEN CO. of Hollywood, maker of lamps for motion picture studios and designer of outdoor illumination, has expanded its business to include distribution of refrigerators and other household appliances. Olesen also anticipates going into the field of television and radar. He provided the electrical spectacle for the opening of the Golden Gate Bridge and originated the illumination of Santa Claus Lane in Los Angeles; developed a "daylight" lamp for motion pictures. He plans to continue this business. In connection with the expansion, Thomas H. Corpe has come from New York as executive vice-president and general manager of the company.

● INFRARED sales and services, including Fostoria and related equipment, formerly handled by Leo J. Meyberg Co. in the San Francisco district have been turned over to the Wuelker Infra-Red and Lighting Co., 967-71 Howard St., San Francisco, telephone Garfield 5824, as of Sept. 18, it was announced by A. H. Meyer, president, Leo J. Meyberg Co. Wuelker will resume manufacture of electrical equipment, halted by the war.

● LEO J. MEYBERG CO.'s San Francisco main office and warehouse on Tenth Street suffered a disastrous fire Sept. 24, with damage of some $300,000. The Victor record stock and other supplies carried at that location were almost completely ruined. Another warehouse of the company on Mission St. contained the manufacturing activities for RCA equipment and considerable stock. It, however, was undamaged.

● THE HOTPOINT franchise at Moscow, Idaho, formerly held by the Washington Water Power Co., has been acquired by Samuel C. Haddock who was to open a new electrical appliance store on Oct. 1. Haddock for nearly 20 years had been associated with the credit department of the Spokane and Eastern.

● ROBERT HETHERINGTON & SON INC. of Sharon Hill, Pa., makers of aircraft and industrial switches, control devices and electronic counters, has opened a West Coast office at 5607 W. Adams Blvd., Los Angeles. Sales will be headed by C. E. Fisher; engineering by L. E. Massie.

● NORMAN B. NEELY Enterprises have moved into new and larger quarters at 7422 Melrose Ave., Hollywood. Neely is Western representative for Hewlett-Packard, Kaar Engineering Co., Presto Recording Corp., Radio Engineering Laboratories, Sensitive Research Instrument Co. and Webster Electric.

● M. L. FOWLER CO., San Francisco, has been dissolved and Fowler is now district manager there for Triangle Conduit and Cable Co. Inc. of New Brunswick, N. J. His headquarters are 1045 Bryant St.

● WESTERN FIBERGLAS SUPPLY LTD., San Francisco, has taken over the electrical insulation division of the Leo J. Meyberg Co.

● EMERYVILLE, CALIF., headquarters plant of the Westinghouse manufacturing and repair department was awarded an Army-Navy E on Sept. 6.

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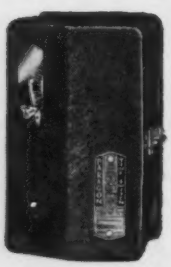

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Paragon has prepared a 4-page, 2 color bulletin containing authoritative information relative to poultry house lighting control. It summarizes the recommendations of leading poultry authorities and gives complete data regarding the wide range of Paragon poultry house time switches. Send for a supply to distribute among your dealers and power companies.

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Paragon Chicago
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PEOPLE

made this news

RICHARD SACHSE of San Francisco, for many years a member of the Railroad Commission, has been appointed to the Federal Power Commission. Sachse came to San Francisco in 1906 after experience as a draftsman and engineer abroad and in other sections of the United States. He has been with the S. P., and Western Pacific, the Reclamation service in Washington and Nevada, served on the California Railroad Commission from 1912 to 1923 and from 1941 until his present appointment. He has been a consulting engineer on state and city valuations and projects and has been a member of numerous state commissions. . . .

General Electric Supply Corp. has announced new appointments in its Salt Lake City organization to head two new sales department divisions. A. E. (Gene) FLEMING will manage the supply sales division and JAMES L. SCHRICKER the appliance sales division. Fleming has been in the area since 1928, first with Utah Power & Light, then with G-E and, during the war, with the U. S. Engineers office. Schricker has been with the supply company for 25 years in Boise and Salt Lake. . . .

MARSHALL WELLS, Westinghouse Lamp Division, joined the Sues-Young Co. in Los Angeles Oct. 1. . . . Lieut.-Col. JOSEPH E. PENGILLY, vice-president, Square D Co, Los Angeles, was expected to return to Los Angeles and resume his position with the company very shortly. . . . J. E. JOHNSON has been made manager of the newly established major appliance division of Gough & Co. Ltd., Vancouver, B. C., electrical wholesalers. . . . J. T. BROWN is now Western agent for Helwig Co., products. His headquarters are in San Francisco. . . . ROBERT MILMOE has been made chief engineer of Cole Electric Co., Los Angeles. . . .

Sachse

B. F. DELANTY, general manager and chief engineer of the Pasadena Municipal Light & Power Dept., retired Oct. 1 after 38 years with the department. He first joined the municipal utility in 1907, having come from Port Townsend, Wash. He had also spent some time at Prescott, Ariz., in mining. DeLanty will be succeeded by EUGENE BETTANIER, who has been chief electrical engineer. Bettanier has been with the utility since 1909. . . . J. H. CRANNELL, electrical inspector, Glendale, Calif., retired Oct. 1 after 21 years as city inspector and head of the department. He has been in this business 50 years, having begun in 1896. Born in Saginaw, Mich., he came to California in 1921 and worked for various contractors until appointed city inspector of Glendale. HARRY HAMILTON succeeds him as chief inspector. . . .

Schricker

Fleming

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STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., required by the Acts of Congress of August 24, 1912, and March 3, 1933, of Electrical West, published monthly at San Francisco, Calif., for October 1, 1945.

State of California } ss.
County of San Francisco }

Before me, a notary in and for the state and county aforesaid, personally appeared George C. Tenney, who, having been duly sworn according to law, deposes and says that he is the Editor of the Electrical West, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, McGraw-Hill Co. of California.....68 Post St., San Francisco 4, Calif.

Editor, George C. Tenney.....68 Post St., San Francisco 4, Calif.

Managing Editor .....None

Business Manager.....Roy N. Phelan, 621 S. Hope St., Los Angeles 15, Calif.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.)

McGraw-Hill Company of Calif., San Francisco, Calif.; McGraw-Hill Publishing Company, Inc., New York City; James H. McGraw, New York City; Howard Ehrlich, New York City; R. A. Balzari, San Francisco, Calif.; N. A. Bowers, San Francisco, Calif.; George C. Tenney, San Francisco, Calif.; John W. Otterson, San Francisco, Calif.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the twelve months preceding the date shown above is.....: ..... (This information is required from daily publications only.)

GEORGE C. TENNEY, Editor.

Sworn to and subscribed before me this 14th day of Sept., 1945.

(SEAL) W. E. SCHORD,
(My commission expires June 2, 1946.)
In and for the City and County of San Francisco, State of California.

EARLE A. CRELLIN has been made assistant engineer of operation of Pacific Gas and Electric Co. in charge of hydroelectric production and maintenance, the domestic water supply systems and hydrographic measurements, to succeed GEORGE H. BRAGG, who retires after more than 42 years of service with PG and E. Crellin has been assistant to Bragg for the past nine years, prior to which time he served as assistant engineer in charge of hydroelectric design for 16 years. . . . W. E. HOLLAND has been appointed director of dealer development in the greater Victoria area by the B. C. Electric Railway Co. . . .

JAMES R. GEDDES of San Francisco has been named production manager for the Fowler Mfg. Co.'s new Portland plant. He had been supervisor of production of air-borne radar equipment for a San Francisco subcontractor. . . . MRS. PHILIP FARIS is the new home service director in the Spokane area for Harper-Meggee Inc. . . . J. H. CLAWSON, Puget Sound Power & Light Co., was elected vice-president of the local chapter of the Controllers Institute of America. M. D. FIELD, California Oregon Power Co. and D. L. MARLETT, Bonneville, were named local directors in their respective controls. . . .

G. L. CROW has been made Pacific district manager of General Electric Co.'s marine section. He comes to the Coast from Schenectady. Named consultant to the section was G. M. (Dad) Le COUNT, well known in West Coast marine, naval and shipping fields. . . . FRANK R. BARNSLEY is now manager of the supply division at Vancouver, B. C. for the Canadian General Electric Co. . . . ROY WELDON, a former Westerner, has returned to the Pacific Coast as G-E's district vacuum cleaner representative, appliance and merchandise department. . . . ALBERT E. BAAK, formerly with Minneapolis-Honeywell, is now executive director, controls division, the Paul Henry Co., Los Angeles manufacturers of electrical parts and equipment. . . .

D. J. CALLAGHAN, JR., after serving 4 1/2 years in the Navy, has returned to the Pacific Gas and Electric Co. sales department at San Francisco. He has been appointed assistant industry coordinator. . . . Returned to Southern California Edison Co. after a year's leave of absence with the Division of War Research of Columbia University are LOUIS LUDEKINS, radio engineer, N. K. YARNELL, engineer, distribution division, F. T. SCHELL, industrial power engineer, BERT F. MILLER, power consultant, Compton district. . . .

DR. ROBERT A. MILLIKAN has retired as administrative head of the California Institute of Technology. He had served as chairman of the executive council of the institute and as chair-

man of the Norman Bridge Laboratory of Physics since 1921. . . . DR. RUSSELL A. NIELSEN, Stanford graduate in 1933 and since 1937 with Westinghouse, will head the company's newly opened Pacific Coast high frequency laboratory at Los Angeles. . . . JOSEPH H. LANDELLS of San Francisco has been given the post of communications application engineer there for Westinghouse. . . . L. S. WING is FPC regional engineer, San Francisco. . . .

CHARLES O. WOODSWORTH, former manager of the Denver municipal airport, has jointed Schockett Electric Co., Denver, as lighting engineer. . . . CARL FLESHER has been appointed to the executive staff, Joshua Hendy Iron Works, Sunnyvale, Calif. He was West Coast regional director of the U. S. Maritime Commission. . . . WILLIAM C. MILES, formerly with Westinghouse in San Francisco, is now radio sales representative there for Stromberg-Carlson Co. . . . PAUL F. KOHLHAAS, since 1941 chief engineer of Columbia Steel Co., has been named to the newly created post of vice-president in charge of engineering. . . .

DEATHS

CHARLES E. CAREY, 55, regional director of the U. S. Bureau of Reclamation, with headquarters in Sacramento, died Sept. 2 in Veterans Hospital, Sawtelle, Calif., after an illness of several months. His career in the West included service with private and public utility interests and private consulting practice. Among posts held were head of the engineering department at the University of Mexico, engineer for Westinghouse at Seattle, consulting electrical engineer to the Pacific Northwest National Resources Committee. In 1937 he joined the Bonneville Administration and in 1942 was appointed chief budget examiner for the U. S. Bureau of Budget, a position he held until he became regional director for the USBR.

BERTRAND P. ROWE, 77, designer of the Southern California Edison Co.'s Big Creek plant, died Sept. 21, in Glendale, Calif. Mr. Rowe was a pioneer in the designing and installation of power plants, among them being the original one at Niagara Falls. He came to California in 1930 as a Westinghouse consulting engineer.

EUGENE ENLOE, Spokane investment banker engaged in electric light and power investments for nearly 40 years, died on Sept. 3.

TOM BENNETT, pioneer electrical contractor, died Sept. 17 after a long illness. He was manager of the Pacific Electrical & Mechanical Co. and, prior to that, had been connected with many of San Francisco's early-day electrical contracting concerns.

JOHN G. DUFFY, who recently took George Brouillet's place as manager of the electrical department of Klimm Co. upon Brouillet's retirement, died Sept. 11.

ERCEL MCCARTY, electrical estimator for Atlas Electric Co., and an oldtimer in electrical contracting in the San Francisco Bay region, died Sept. 21 in San Francisco.

WANTED—Electrical Engineer for application, field research and sales engineering for national manufacturer wire and cables. Location, Coast. State complete experience, history, education, personal description. Enclose recent photograph. State salary. **Write Box 210, Electrical West, 68 Post Street, San Francisco, Calif.**

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PROFILES *of the month*

R. W. Joyce made general commercial manager by Puget Sound Power & Light

A. L. Pollard, now general superintendent of operations for Puget Sound

Above—Section chairmen at NWEL&PA meet: R. J. Davidson, engineers; R. H. Sessions, personnel; Clause Groth, accounting; Jim McKay, business development. Right—Rus Horning, Seattle contractor, and Carl Edstrom, Portland dealer, D. B. Leonard, chairman of the electrical development committee

New officers Bureau Radio and Electrical Appliances, San Diego; S. L. Hall, treasurer; J. Clark Chamberlain, manager; O. G. Thompson, vice-president; William Powell, retiring president; Frank Guasti, president; Lou Wiese, vice-president

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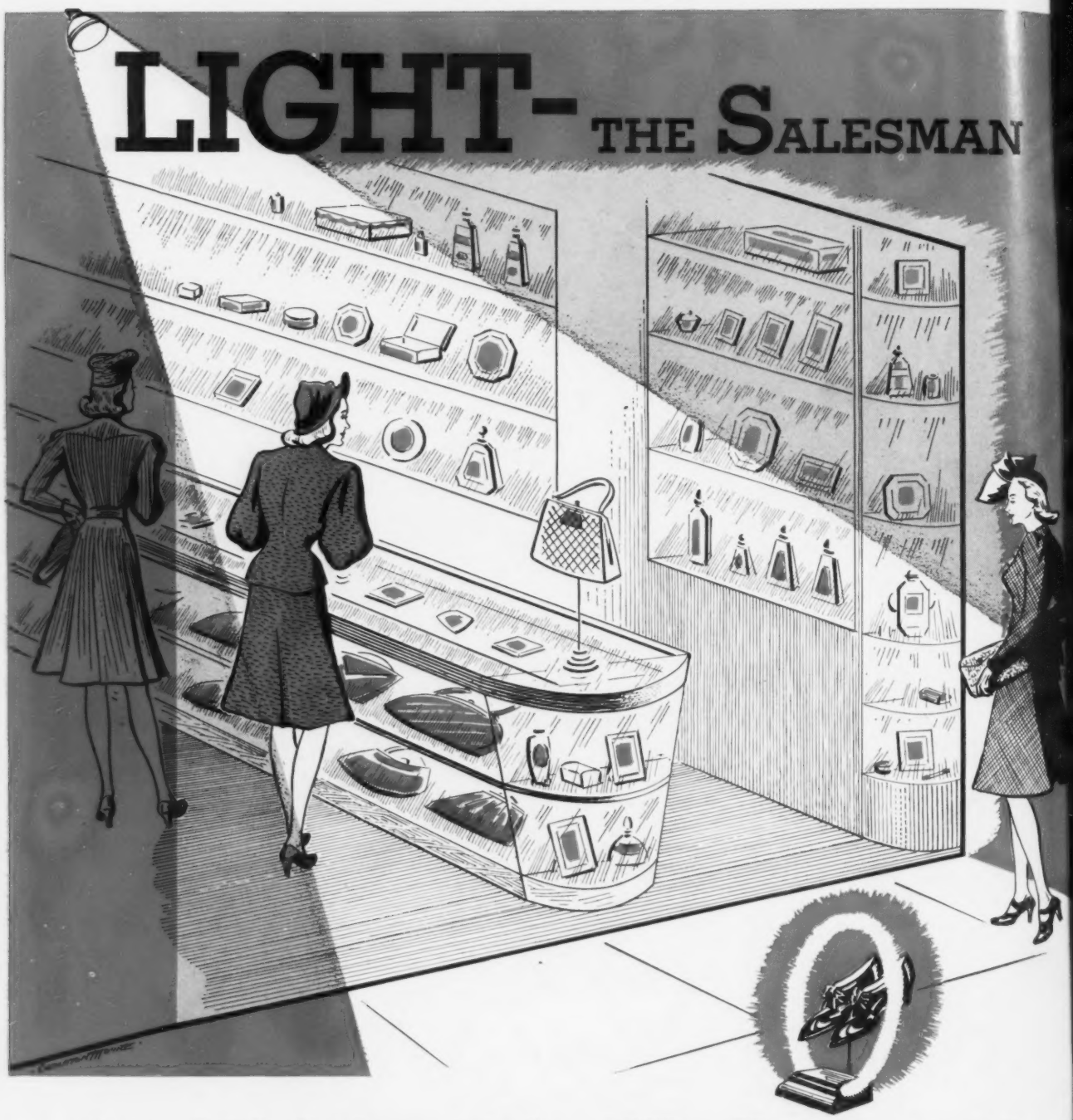

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